The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

February 1, 2021 via electronic mail

Senator Chuck Morse, Chairman
Drinking Water and Groundwater Trust Advisory Commission

Project: Abenaki Water Co., Inc., Rosebrook System (Bretton Woods) – **Pressure Reduction Project**

Subject: **Drinking Water and Groundwater Trust Fund (DWGTF) Funding Application Forms for the Special Projects Assistance Program,** dated January 15, 2021

Dear Chairman:

The New Hampshire Department of Environmental Services (NHDES) has reviewed the subject special project application for the Abenaki Water Co., Inc. (Abenaki) Rosebrook System Pressure Reduction Project. Section 5.A.2 of the DWGTF Award Plan adopted May 11, 2020 (Award Plan) outlines three tasks to be completed by NHDES when an application to the Special Project Assistance Program is received: 1) review the application to determine that it meets the project readiness eligibility requirements outlined in Section 5.A.1 of the Award Plan; 2) screen the applications using the criteria identified in Drinking Water Loan and Gran Program DWGTF Rules for Construction Projects adopted March 11, 2019 (Construction Rules); and 3) evaluate if the project demonstrates one or more of the circumstances for special project consideration identified in the Award Plan.

The application meets the eligibility requirements of Section 5.A.1 of the award plan which requires the submittal of a certificate of the authority to submit the application and a planning document. Based on the screening and evaluation requirements of the Award Plan, NHDES is of the opinion that the project demonstrates the circumstances for the Commission's consideration as a special project out-of-cycle of the annual application review process as defined in the Award Plan and the project meets several of the screening criteria presented in the Construction Rules. Specifically, the special project application demonstrates that the project is time critical.

The subject project is to address a significant deficiency related to high pressure areas throughout the system at unsafe levels among other requirements issued by NHDES in a Letter of Deficiency, dated December 1, 2020 (attached). Abenaki applied to the Drinking Water State Revolving Fund in 2020 for a loan to prepare engineer plans and specifications in order to meet the August 2021 deadline for these documents in the amount of $175,000, which did not rank high enough for funding. Abenaki has decided to proceed with seeking funding to complete the full project and is requesting from the DWGTF $2,520,000 in loan funds and $280,000 in grant funds.

Application is Time Critical

NHDES concurs that Abenaki's application is time critical due to the August 2021 enforcement deadline for engineer plans and specifications for the project and the inherent safety issues with operating a system at high pressures. If

approved, Abenaki will need to seek PUC approval for the loan funds. It is critical that they have funding in place as soon as possible to start the PUC application process.

Grant Request due to Economic Hardship

Based on the subject application, Abenaki is requesting $280,000 in grant funds which is 9.7% of the total project cost to mitigate the impact on the rate payers and have maximized the DWGTF loan. The loan request is $2,520,000 which is 87% of the total project cost. Without the grant, Abenaki states implementation of this project may result in an estimated 62% rate increase. Grant funds will help to offset this increase.

NHDES is of the opinion that the grant and loan request should be considered in the Special Project Assistance Program and concurs that the subject project is time-critical.

If you have any questions, please contact me at 603-848-4259 or Erin.Holmes@des.nh.gov.

Sincerely,

Erin Holmes, P.E.
Drinking Water and Groundwater Trust Fund Administrator
MtBE Remediation Bureau

Attachments: NHDES December 1, 2020 Letter of Deficiency

Enclosures: Drinking Water and Groundwater Trust Fund funding applications
NHDES Screening Worksheet

Route/cc: Randal Suozzo, P.E., NHDES DWGB
CC: Michael Juranty, P.E., NHDES MtBERB

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Robert R. Scott, Commissioner

December 1, 2020

LETTER OF DEFICIENCY #DWGB 20-032
Certified Mail #7019 1120 0001 7107 7303

Donald Vaughan
Abenaki Water Co
32 Artisan Ct, Ut 2
Gilford, NH 03249
Also via email: dvaughan@newenglandservicecompany.com

Subject: Carroll - Public Water System: Rosebrook Water (PWS ID: 0382010)

Dear Mr. Vaughan.:

The records of the NH Department of Environmental Services ("NHDES") show that the Rosebrook Water water system (the "Water System") is classified as a public water system ("PWS"), as defined by RSA 485:1-a. A PWS is defined as any water system supplying 15 or more services, or 25 or more people for 60 or more days per year. The Water System serves approximately 408 connections and 1020 people on a year round basis. As owner of the Water System, Abenaki Water Company ("Abenaki") is required to comply with NH Administrative Rule Env-Dw 100-1200, *New Hampshire Drinking Water Rules*, for the purpose of providing safe and reliable drinking water.

Per Env-Dw 720, *Inspections; Significant Deficiencies*, PWS's with a public water supply source are subject to periodic inspections or sanitary surveys by NHDES staff to evaluate the adequacy of the source(s), storage facilities, equipment, operation, and maintenance for the protection of public health. In addition, Env-Dw 717, *Groundwater Monitoring and Treatment*, lists significant deficiencies applicable to PWS's served by groundwater. Env-Dw 720 and Env-Dw 717 require a PWS owner to correct significant deficiencies identified during a sanitary survey within 120 days of receiving notice from NHDES of a significant deficiency, unless a shorter deadline has been established.

On March 29, 2019, NHDES staff conducted a sanitary survey inspection of the Water System. The Sanitary Survey Deficiency Letter, sent to Abenaki by mail on June 7, 2019, identified four significant deficiencies and the required actions to correct the deficiencies. One of the four deficiencies was subsequently corrected.

The three following significant deficiencies have not been corrected according to NHDES records:

Significant Distribution Deficiency
The Water System's pressure exceeds the regulatory limit specified in Env-Dw 404.01(a), *Design Standards for Large Public Water Systems*. More specifically, the *Recommended Standards for Water Works* requires the working pressure to be between 60 to 80psi and for pressure reducing valves to be in place if the static pressure exceeds 100psi. *To correct the deficiency, permanently address the system's pressure exceedances to maintain a normal working pressure between 60 and 90psi, with a minimum working pressure of 35 psi and a maximum static pressure of 100 psi.*

Significant Treatment Deficiency
During the inspection, there was no chemical containment at the well station for the storage of chemicals or at the bulk mixing tank. Chemical containment is required for operator safety and for preventing potential groundwater contamination should a spill occur. *The Recommended Standards for Water Works*, as referenced in Env-Dw 404.01(a), requires that chemical containment be provided for 100% of the volume of the largest container. *To correct the deficiency, install containment for all tanks used for storing or mixing chemicals and chemical pumps.*

Operation and Maintenance Inadequate

Both of the chemicals used for treatment at the Water System, soda ash and NaOCl, are mixed in the same tank. Due to the chemical mixing, the recording of the daily quantities for NaOCl, required per Env-Dw 503.10, *Public Water System Operational Requirements,* are more of an estimate than an accurate quantity. Additionally, the mixing tank makes it difficult to hold a consistent chlorine residual. *To correct the deficiency, each chemical feed system should operate on its own to allow for accurate chemical recordings and should have separate storage, piping and pumping equipment, in addition to separate injection points.*

In the Sanitary Survey Deficiency Letter, NHDES noted that correction of the deficiencies or submission of a Corrective Action Plan ("CAP") was required within 30 days, and also noted the requirement that NHDES be notified in writing when the deficiencies had been corrected.

On June 21, 2019, NHDES staff sent an email to representatives of the Water System with an outline of information needed for a CAP to correct the deficiencies. The Water System responded by email on June 23, 2019 with dates for anticipated correction contingent on decisions pending with the NH Public Utility Commission ("PUC"). On August 26, 2020 and September 9, 2020, NHDES sent emails to representatives to establish proposed deadlines for the submission of design plans and project bidding for correction of the deficiencies, barring any other approved deadlines. On September 1, 2020 and September 18, 2020, NHDES received emails from representatives regarding Abenaki's inability to commit to the proposed deadlines with the lack of decisions from the PUC. On November 17, 2020, NHDES spoke with you to explain that PUC's review cannot prolong correction of the significant deficiencies to protect public health and safety. To date, NHDES has not received a proposed CAP for correction of the deficiencies.

Per Env-Dw 717.22(d) and Env-Dw 720.14(a)(1), the failure to correct the deficiencies within 120 days of being notified of the deficiencies, or be in compliance with an approved CAP, has resulted in the Water System incurring a treatment technique violation requiring public notice of the violation. **This Letter of Deficiency shall serve as formal notice of this violation.**

NHDES believes the violations can be corrected and future violations prevented by taking the following actions:

DEADLINE	ACTION
January 11, 2021	Provide public notice to consumers for the **failure to correct the noted significant deficiencies** within 120 days from the date of the sanitary survey and provide proof of public notice to NHDES, per the instructions on the template at *www.des.nh.gov*. Click on "A to Z List", and select "Public Notice (for Public Water Systems)", "Sanitary Survey" heading, "Sanitary Survey Significant Deficiency."
Continue to perform public notice every 3 months* for as long as the deficiency is unresolved and submit proof of public notice to NHDES, in accordance with the instructions provided on the public notice template available as indicated above.	
August 2, 2021	Submit completed design plans for modifications/improvements of the Water System in order to correct the significant deficiencies noted during the sanitary survey as detailed above.
By the NHDES-approved correction date	Correct the significant deficiencies and submit documentation, including photographs, to NHDES confirming that the deficiencies have been corrected.

*Water system owners may request an alternate repeat notice frequency in accordance with Env-Dw 801.10 and 801.13, *Alternate Frequency for Repeat Standard Public Notice*. NHDES will review and approve the request for modification of the repeat notice frequency if the proposal adequately protects human health and the

environment and meets all applicable federal requirements. In no event shall repeat notice be given less frequently than once per year.

Please note that NHDES may initiate formal action for this violation, including issuing an order requiring the deficiencies to be corrected, proposing an administrative fine of up to $4,000 per violation, and/or referring the matter to the NH Department of Justice for imposition of appropriate penalties.

All information as requested above should be addressed as follows or emailed to *dwgbenforcement@des.nh.gov*:

Kim Bourgouin
Enforcement Section
Department of Environmental Services
Drinking Water and Groundwater Bureau
29 Hazen Drive, PO Box 95
Concord, NH 03302-0095

NHDES records indicate that the Water System currently holds an SOC chemical monitoring waiver, which expires December 31, 2021. Please note that systems with unresolved significant deficiencies identified by NHDES will be denied requests for an SOC monitoring waiver, per Env-Dw 712.20(c).

Please contact Randy Suozzo at (603) 271-1746 or by email at *randal.a.suozzo@des.nh.gov*, if you have any questions regarding the noted sanitary survey deficiencies. If you have any other questions regarding this letter, please contact Kim Bourgouin by email at *kim.c.bourgouin@des.nh.gov* or *dwgbenforcement@des.nh.gov*, or by phone at (603) 271-0713.

Sincerely,

Brandon Kernen, P.G., Administrator
Drinking Water and Groundwater Bureau

cc: NHDES Legal Unit
File

ec: Taylor Deogburn, Primary Operator, *tdeogburn@newenglandservicecompany.com*
Health Officer, Town of Carroll, *twinmountainfireambulance@gmail.com*
Randy Suozzo, NHDES/DWGB, Sanitary Surveyor
EPA, Region 1

Criteria to be Considered by the DWGTF Advisory Commission - Screening Worksheet

The Drinking Water and Groundwater Trust Fund (DWGTF) **Drinking Water Loan and Grant Program Rules for Construction** Projects, adopted March 11, 2019 by the DWGTF Advisory Commission, outlines *criteria that may be considered by the Commission when determining whether or not to award a loan or grant*. In accordance with the DWGTF 2019 Award Plan, the project has been screened by the New Hampshire Department of Environmental Services.

Applicant Name:	Abenaki Water Company (for Rosebrook Water PWS #0382010)
Project Name:	Pressure Reduction Project
Application Date:	January 15, 2021

Criteria Screening Summary Table		
YES	**NO**	**NHDES Screening Notes**
1. Proposed project results in the removal, reduction or mitigation of contaminated related to groundwater or drinking water.		
	X	No contamination
2. Proof of thoroughness with respect to both the application and project development.		
X		Application outlined scope and estimated costs
3. Demonstrates project readiness through methods including but not limited to letters of support from local entities, preparation and submittal of preliminary engineering reports, and confirmation of approval of funds from leveraged funding sources.		
X		Recommended design alternative included. A project kickoff meeting already occurred. However, NHPUC approval is needed. Letters of support from Town of Twin Mountain FD and NHDES.
4. Project is consistent with the applicant's established Asset Management Program and proposed management of assets, Capital Improvement Plans, and rate analysis associated with the project.		
X	X	No – There is no known NHDES approved asset management program (AMB) in-place. Applicant claims to utilize and AMP.
5. Project has impact on economic development.		
	X	There is no known planned development
6. Project is energy efficient or increases energy efficiency of the system.		
	X	
7. Project improves water efficiency.		
	X	Significant reduction in major breaks expected
8. Project enhances source water protection or acquisition of water sources for public consumption.		
N/A		
9. Project involves a unique or innovative approach.		
X		Previous system owners failed to take action because of the design difficulties and all the work it entails.
10. Project completion will result in the interconnection of two or more Public Water Systems (PWS).		
	X	
11. Project has long term viability.		
X		Significant pressure reductions will provide a more reliable system.
12. Project is for a PWS serving customers with a low Median Household Income or high Affordability index.		
	X	According to the application, project may significantly impact AI.

FORM 1

NEW HAMPSHIRE DRINKING WATER &GROUNDWATER TRUST FUND

DWGTF FUNDING APPLICATION FORM for the Annual Drinking Water Construction Projects Assistance Program

RSA/Rule: RSA 485-F

The Drinking Water and Groundwater Advisory Commission is seeking funding applications requesting assistance from the Drinking Water and Groundwater Trust Fund (DWGTF) for drinking water infrastructure improvement projects.

Submission Instructions: Submission of applications online through State of NH Online Forms is strongly encouraged to reduce errors and processing time. ***Anticipated to be available online June or July 2020.***

1. Visit the State of NH Online Forms web portal at https://onlineforms.nh.gov.
2. Register for an Online Form account. If you already have an account from submitting other State of NH Online Forms you can use it for this application.
3. Click the "Finder" button in the top right. Search for "DWGTF". Select the "DWGTF Funding Application Form for the Annual Drinking Water Construction Projects Assistance Program".
4. Complete all steps and submit. You can save and return to your application before submitting.
5. After submitting, you can track the status of your application through the State of NH Online Forms web portal.

If the applicant is unable to submit an online Form, a PDF may be emailed to ***erin.holmes@des.nh.gov***.

The deadline for submission is September 10, 2020 (midnight).

For eligibility requirements, guidance in completing this application, and additional information regarding the criteria the Commission may use in making funding decisions, refer to the Advisory Commission's **"Rules for Construction Projects"** and **"2020 Award Plan"** posted on the Trust Fund website at https://www4.des.state.nh.us/nh-dwg-trust/

1. APPLICANT INFORMATION			
APPLICANT NAME: Nicholas LaChance			
ORGANIZATION NAME: Abenaki Water Company			
PWS # (if applicable): 0382010	Ownership: ☐ Public (e.g. Municipal) ☐ Private (e.g. Mobile Home Park/Condo Association)		
ADDRESS: 37 Northwest Drive			
CITY: Plainville		STATE: CT	ZIP: 06062
CONTACT PERSON: Nicholas LaChance		TITLE: Vice President	
PHONE: 860-747-1665	EMAIL: nlachance@newenglandservicecompany.com		

2. THRESHOLD REQUIREMENTS TO SUBMIT AN APPLICATION
Instructions**: In accordance with the Commission's "2020 Award Plan", the Commission requires that the funding applications include two submittals to meet the threshold for project readiness. These forms are available on the* Trust Fund website at https://www4.des.state.nh.us/nh-dwg-trust/ ***Attach these submittals to this application. Applications submitted without these attachments will be considered ineligible and will not be reviewed.
FORM 2 – Authority to Submit a Funding Application
FORM 3 – Planning Document

FORM 1

3. PROJECT INFORMATION		
PROJECT NAME: Pressure Reduction Project		
SELECT ONE: ☐ Design/Preliminary Engineering Only	☒ Design and Construction	☐ Construction Only
PROJECT DESCRIPTION: *Provide a concise (<50 words) summary of the project. If additional space is needed, provide additional information in the Planning Document (see Section 2).* **The Rosebrook distribution system has discharge pressures in excess of 190 psi. The Company has been charged to reduce these pressures to under 110 psi throughout the distribution system. This application is requesting funding for the completion of the engineering designs and specifications, as well as the construction costs.**		
PRIORITY: *If you are submitting Funding Applications for multiple projects, please rank the projects in order of priority:* 1. 2.		

4. PROJECT COST/BUDGET (DRINKING WATER COSTS ONLY)	
Do not include preliminary design engineering and testing costs prior to submittal of the funding application as a component of total project cost.	
CATEGORY (add rows as needed)	**AMOUNT**
Construction Costs	$ 2,500,000
Construction Contingency	$ 250,000
Engineering/Planning Costs	$ 150,000
Other Costs (describe):	$
TOTAL PROJECT COST	$ 2,900,000
Project costs are based on (e.g. engineering study w/ date and author, bid prices, etc.): Project costs are based on preliminary engineering studies performed by Horizons Engineering.	

5. FUNDING REQUEST (DRINKING WATER COSTS ONLY)		
The sum of Other Funds Contributing to the Project + Requested Trust Fund Loan + Requested Trust Fund Grant must equal the Total Project Cost from Section 4 above. *Note: Per the Commission's rules, the Commission will endeavor to leverage the DWGTF to the greatest extent possible by taking into consideration, among other things, supplemental funds provided by the applicant. Applications for loans or grants that demonstrate that the applicant has exhausted all other possible funding sources for the proposed project may be given priority. There is no match requirement for loans; however, project proposals that provide the greatest amount of funds from sources other than DWGTF grants or loans whenever possible may be given priority.*		
OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$ 100,000	Source: Internally generated funds
OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$	Source:
OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$	Source:
REQUESTED TRUST FUND **LOAN** AMOUNT: $ 2,520,000 *(This must be a specific dollar amount.)*	LOAN PERCENT OF TOTAL PROJECT COST: 86.9% *(See Section 5 of the Commission's "2020 Award Plan".)*	
REQUESTED **LOAN** TERM (select one): ☐ 5 ☐ 10 ☐ 15 ☒ 20 ☐ 25 *The loan term cannot exceed the useful life of the financed improvement(s).*		
REQUESTED TRUST FUND **GRANT** AMOUNT: $ 280,000 *(This must be a specific dollar amount. Complete Section 6 if requesting Trust Fund grant.)*	GRANT PERCENT OF TOTAL PROJECT COST: 9.66% *(See Section 5 of the Commission's "2020 Award Plan".)*	

FORM 1

Funding Plan Narrative: *If appropriate, attach a narrative explaining the Funding Plan in more detail. For example, if non-DWGTF funds have not been confirmed, explain the applicant's plan for funding the project if that outside funding is not approved.* Alternative funding to supplement DWGTF funds have not been secured due to the compressed timeframe the Company has to complete the engineering portion of this project per deadlines placed by NHDES. Should the DWGTF not be able to provide funding, the Company will seek funding through its private lender.

6. GRANT REQUEST JUSTIFICATION

***Instructions**: If you are requesting grant funds, please complete the section below. The DWGTF Advisory Commission will review grant requests to make funding decisions.*
Note: Per the Commission's rules, projects that first request DWGTF loans whenever possible may be given priority over similar projects that request DWGTF grants. Projects that request a smaller proportion of DWGTF grant as compared to DWGTF loans whenever possible may be given priority.

Why does this project require grant funding? The size and magnitude of this project is immense. The public water system serves approximately 400 customers, of which, over 50% of the water consumption is attributed to the Mount Washington Hotel. Preliminary estimates indicate roughly a 62% rate increase over the present rates as it relates to this project. The requested grant amount will help to mitigate the significant rate impact that this necessary project will have.

Has the applicant maximized the proportion of Trust Fund loan versus Trust Fund grant requested? ☒ yes ☐ no

7. OUTSIDE FUNDING SOURCES

Instructions**: The Advisory Commission encourages applicants to seek outside funding sources and may consider the overall funding plan and percentage of outside funding sources when making funding decisions. To assist the Commission in evaluating this project, please provide the following information.* ***Enter these amounts in Section 5 above.

Have you applied to the Drinking Water State Revolving Fund (DWSRF) for this project? ☒ yes ☐ no
If yes, how much did you request and what is the status? If no, why not? The requested amount was for the engineering plans and specifications in the amount of $175,000. The application was denied in September 2020.

Have you applied to the USDA Rural Development (RD) program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? The Company is not eligible for any grant opportunities at this time.

Have you applied to Community Development Block Grant (CDBG) program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? The Company is not eligible for any grant opportunities at this time.

Have you applied to Northern Border Regional Commission program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? The Company is not eligible for any grant opportunities at this time.

Have you applied to other funding programs besides those listed above? ☐ yes ☒ no
If yes, please specify which programs, how much did you request, and what is the status? If no, why not? Time is of the essence. The Company believes that the DWGTF is the most likely solution to secure funding other than through its private lender.

Will developers, property owners, or other private entities be contributing to the project? ☐ yes ☒ no
If yes, what is the dollar amount, what is the status, and are there conditions on those contributions? If no, why not? This project has met much opposition from its customers and their willingness to endorse it. However, the Company has now been directed by the NHDES to complete the project.

Is the applicant contributing its own funds to the project (cash, capital reserve, bonding from another lender, etc.)? *Do not include the DWGTF loan and grant being requested in Section 3 above.*: ☒ yes ☐ no
If yes, what is the dollar amount, what is the status, and are there conditions on those contributions? If no, why not? The Company has already spent its internally generated cash for preliminary engineering specifications and subsequent meetings. The Company anticipates its total spend to be about $100,000. The Company simply doesn't have any additional disposable funds to put forth. Further, debt will lessen the burden on a rate increase versus the Company investing additional equity. In order to receive funding, the Company will need to file a petition with the NHPUC which will have an assigned cost in it of itself, above and beyond the $100,000. Further, the Company was not profitable in 2020 and barely turned a profit in 2019. All cash on hand must be preserved to pay ongoing O&M expenses, vendors and be ready to deploy in the event of an emergency.

Has the applicant exhausted all other possible funding sources for the proposed project? ☒ yes ☐ no

8. OTHER CONSIDERATIONS

***Instructions**: The Advisory Commission may consider the criteria below when determining whether or not to award a loan or grant. To assist the Commission in evaluating this project, please provide the following information.*

Will the proposed project result in the **removal, reduction, or mitigation of contamination related to groundwater or drinking water**? ☐ yes ☒ no Please explain briefly:

Has a **preliminary engineering report** been prepared for the project? *Attach a copy if desired. The Commission may request a copy during its review.* ☒ yes ☐ no Date and name of preparer: July 2016 by Horizons Engineering

FORM 1

Median Household Income (MHI): $ 59,653
If known, MHI of population served (using the results of a recent income survey or latest data from the American Community Survey). Note: An income survey may be required for small, privately-owned water systems serving portions of a community where the survey data does not accurately reflect the income of the residents.

Current Annual Residential Water Rate: $ 633.60
Calculate based on 71,996 gallons/year. If cost of water is included in other charges (rent, condominium fee), break out the estimated annual cost per unit of water. NHDES may request back-up documentation as these figures are used to determine affordability.

Projected Annual Residential Water Rate at Project Completion: $ 1026.43
If you have calculated the projected water rate at project completion, please enter it here and provide an explanation of how it was calculated. If not, enter TBD.

Affordability Index: 1.72 (Projected Annual Water Rate / MHI x 100)

List **letters of support** from local entities. Attach copies if available. The Town of Carroll Fire Department and the New Hampshire Department of Environmental Services have provided letters of support, which are attached to this application.

Is the project consistent with the applicant's **Asset Management Program**? ☒ yes ☐ no Please explain briefly:
The extremely high pressures residing in the distribution system place a significant undue stress on the plant and equipment necessary to deliver a safe and reliable water service. Reducing the pressure will ease the stress and burden on the system.

Is the project consistent with the applicant's **Capital Improvement Plan**? ☒ yes ☐ no Please explain briefly:
Since acquiring the Rosebrook system, the Company has been working toward gaining regulatory support to initiate this project. The project is well documented and falls within the Company's capital improvement plan.

Has the applicant conducted a **rate analysis** for the project? ☒ yes ☐ no Please explain briefly:
A preliminary analysis has been conducted uses our best estimates at this time indicating a 62% increase in water rates at the completion of the project.

Briefly describe the project's impact on **economic development**. The project will have a positive impact on economic development as it'll provide a safer water service for new development to hook into.

Will the project improve **energy efficiency**? ☐ yes ☒ no Please explain briefly:

Has the applicant completed an **energy audit**? ☐ yes ☒ no
If so, is this project a recommendation of the audit? ☐ yes ☐ no Please explain briefly:

Will the project improve **water efficiency**? ☒ yes ☐ no Please explain briefly:
The reduction of pressure will reduce the chance of main breaks, blown out meters and pump station failures, all of which have happened in the past causing significant damage and life-threatening situations.

If applicable, describe how the project involves a unique and **innovative approach** and how it could be a valuable demonstration project to other water systems and/or communities.

Will the project result in the **interconnection** of two or more Public Water Systems (PWS)? ☐ yes ☒ no Please explain briefly:

Will the project result in the elimination of a PWS through **connection to a more viable PWS**? ☐ yes ☒ no Please explain briefly:

How many estimated **people** will the project serve? This is difficult to quantify as the number of people utilizing the system at any given time is greatly dependent on the occupancy of the Mount Washington Hotel. The Company estimates that 1,500 on average utilize the system.

How many **service connections** will the project serve? 410

9. PROJECT SCHEDULE	
Date Authority to Borrow and/or Accept Grant Funds was received or will be received	4/1/21
Anticipated Design Start Date	1/1/21
Anticipated Construction Start Date	4/1/22
Anticipated Project Completion Date	11/15/22

AUTHORIZATION/CERTIFICATION	
By signing below, you are certifying that the information in this Funding Application and in any attachments are true, correct and complete to the best of the representative's knowledge and that you are authorized to submit this Funding Application. ***Also attach FORM 2 – Authority to Submit a Funding Application (see Section 2).***	
Signature of Authorized Representative:	Date: 1/15/21
Print Name: Nicholas LaChance	Title: Vice President

FORM 1S

DWGTF

FUNDING APPLICATION FORM

for the **Special** Projects Assistance Program

NEW HAMPSHIRE DRINKING WATER &GROUNDWATER TRUST FUND

RSA/Rule: RSA 485-F

To be considered for the Special Projects Assistance Program, complete BOTH the Funding Application Form for the Annual Drinking Water Construction Projects Assistance Program AND this supplemental form. See below for submittal instructions.

For eligibility requirements, guidance in completing this application, and additional information regarding the criteria the NH Drinking Water and Groundwater Advisory Commission may use in making funding decisions, refer to the Advisory Commission's **"Rules for Construction Projects"** and **"2020 Award Plan"** posted on the Trust Fund website at https://www4.des.state.nh.us/nh-dwg-trust/

An applicant may apply to the Special Projects Assistance Program **at any time** and projects will be reviewed and evaluated on a case by case basis. NHDES will screen the Funding Application using the criteria identified in the Advisory Commission's **"Rules for Construction Projects"** and **"2020 Award Plan"**. NHDES will also evaluate whether the project demonstrates one or more of the following circumstances as determined by the Commission for consideration outside of the annual application review:

(1) Addresses Drinking Water Contamination. The Commission considers addressing contamination paramount when evaluating project need.

(2) Time Criticality. The time critical aspect makes it impractical for the project to be considered in the annual application review. This may include, but is not limited to:
   i. Public health impacts.
   ii. Delays that would significantly impact project cost.
   iii. Project is tied to another project's schedule where completion is critical for efficiency or cost savings.

(3) Grant Request Due to Financial Hardship. An applicant may tailor its request to account for financial hardship. For instance, an applicant may be able to demonstrate through its median household income (MHI) and affordability index that it cannot afford to incur additional debt.

(4) Projects that Support Economic Growth. Special consideration may be given to projects that create or expand drinking water systems which in turn expand the economic well-being of a community. Further specific information on this type of project is provided in the Commission's "2020 Award Plan", Attachment C.

Following screening by NHDES, the Commission will decide whether or not to consider a project for the Special Projects Assistance Program and will notify the applicant of their decision and next steps, as applicable.

Submission Instructions: Submission of applications online through State of NH Online Forms is strongly encouraged to reduce errors and processing time. ***The online form is anticipated to be available June or July 2020.***

1. Visit the State of NH Online Forms web portal at https://onlineforms.nh.gov.
2. Register for an Online Form account. If you already have an account from submitting other State of NH Online Forms you can use it for this application.
3. Click the "Finder" button in the top right. Search for "DWGTF". Select the "DWGTF Funding Application Form for the Special Projects Assistance Program".
4. Complete all steps and submit. You can save and return to your application before submitting.
5. After submitting, you can track the status of your application through the State of NH Online Forms web portal.

If the applicant is unable to submit an online Form, a PDF may be emailed to ***erin.holmes@des.nh.gov***.

Erin.holmes@des.nh.gov | (603) 271-8321
https://www4.des.state.nh.us/nh-dwg-trust/

FORM 1S

1. SPECIAL PROJECT SUPPLEMENTAL INFORMATION
CONTAMINATION. Does this project address an immediate threat to public health from contaminated drinking water? ☐ yes ☒ no Please explain briefly: *Attach relevant testing data.*
TIME CRITICALITY. Does the time critical aspect of this project make it impractical for the project to be considered in the Commission's annual application review? ☒ yes ☐ no Please explain briefly: NHDES has issued an August 2, 2021 deadline for the completion of engineering plans and specifications. The Company will need funding in order to pay for these.
FINANCIAL HARDSHIP. Is this project unaffordable without a grant from the DWGTF? ☒ yes ☐ no Please explain briefly: The magnitude of the total project is roughly $2,900,000; which equates to an estimated 62% rate increase. Grant funds will help to offset this substantial increase as there are only 410 service connections within the Rosebrook system. *Provide additional information on water rates, median household income, and grant request on the DWGTF Funding Application Form for the Annual Drinking Water Construction Projects Assistance Program.*
ECONOMIC GROWTH. Does the project create or expand drinking water systems which in turn expand the economic well-being of a community? ☒ yes ☐ no Please explain briefly: The elimination of a public/health safety concern, in the form of extreme water pressures, allows for the opportunity to expand the distribution system in a safe manner. *Provide supporting documentation such as Memoranda of Understanding, letters of support, etc.*

AUTHORIZATION/CERTIFICATION	
By signing below you are certifying that the information in this Funding Application and in any attachments are true, correct and complete to the best of the representative's knowledge and that you are authorized to submit this Funding Application.	
Signature of Authorized Representative:	Date: **1/15/21**
Print Name: **Nicholas LaChance**	Title: **Vice President**

Please note, Abenaki Water Company acquired the assets of the Rosebrook system on August 9th, 2016 per PUC Order # 25,934 as a part of docket # DW 16-448

1. Existing Conditions – The majority of the Rosebrook Water System is located in a valley area with the Bretton Woods Ski Area to the Southwest, and another high elevation area to the Northeast. The system currently experiences excessive static pressures of approximately 195 psi in the lower elevations. The system was designed with a 650,000-gallon storage tank situated at a high elevation, on the Bretton Woods Ski Area. The excessive system pressures are caused by a combination of the discharge pressures at the pump station, required to supply high elevation tank, and the tank elevation in relation to the elevations of the rest of the system. A single pump station located at the site of the system's two wells supplies the storage tank by pumping water through the distribution system. There are no other pump/booster stations, and there are no pressure reducing valves within the distribution system to otherwise mitigate the high pressures. Operationally, the system lacks the structures and controls to modulate pressures within specific areas of the system.

2. Project Need – The New Hampshire Department of Environmental Services (NHDES) issued a Letter of Deficiency (#DWGB 20-32), identifying the excessive pressures as a significant deficiency. A second significant deficiency identified the lack of containment area for the chemicals used for treating the system, and the lack of dedicated tanking for each of the chemicals. The project improvements are needed for the system to operate under safe pressures for both customers and water system personnel. High pressures lead to premature failure of plumbing related appliances and fixtures. Water system personnel are also at risk working on a system with static pressures approaching 195 psi. These high system pressures have caused issues in the past including failed hydrants, isolation valves, and service connections. Although there are design and operational considerations that must be addressed with any plan to reduce system pressures, there are legitimate concerns with current operations. The high pressures are a safety concern, result in excessive wear and tear on pumping equipment, piping, and appurtenances, and lead to premature equipment and material failures. There have been several severe leaks as a result of high system pressures, including a catastrophic failure of a fitting in the well pump station that resulted in loss of potable water and fire protection throughout the system for an extended period of time. The repairs were very costly (over $100,000) and not covered by insurance. There are also a number of valves in the system that either do not function at all, or are only partially operable due to high system pressures. The well pump station has limited space for the storage of chemicals and the required containment areas. Per the NHDES Letter of Deficiency, the issue of containment and the separation of feed chemicals will need to be addressed.

3. Alternative evaluation – As part of the engineering design services, Horizons Engineering will assess up to three alternatives for the system configuration. All of the alternatives will include the construction of pump stations and pressure reducing valves due to the nature of the pressure problem and the differing elevations across the system. The recommended alternative discussed below is a viable alternative that has been preliminarily studied by Horizons Engineering, and where a comprehensive preliminary opinion of probable cost was developed.

4. Recommended Alternative – The recommended alternative is to construct the following (excerpted from Horizons Engineering System Evaluation for Pressure Reduction dated July 2016):
    - Replace existing well pumps in Well #1 and Well #2 with two new well pumps capable of the same flow rates (325 gpm for Well #1 and 425 gpm for Well #2) at a discharge pressure of 100 psi. This will reduce the system pressure at the pump station from approximately 185 psi to 100 psi at a new system grade line of 1,810 +/-. The well pumps will continue to be controlled by the water level(s) in the 650,000-gallon atmospheric storage tank.
    - Construct a new booster station on the existing 16-inch diameter transmission main from the pump station to the storage tank. This booster station is necessary to boost water from the proposed system grade line of 1,810 up to the existing storage tank elevation of 2,010 +/. The booster station would be located adjacent to the Rosebrook Townhomes residential development at an elevation of 1,680 +/-. The station must be located below the distribution mains to Rosebrook Townhomes and Mountain Views to allow those developments to utilize the 2,010-storage tank grade line. The station would have duplex centrifugal pumps capable of 425 gallons per minute to match the output of Well #2. The booster station would be controlled by water level(s) in the atmospheric storage tank and would start and stop in conjunction with the well pumps.

    - Install a bypass line and pressure reducing valve (PRV) in the Storage Tank Booster Station to allow water from the storage tank to back feed and supply the Rosebrook system. The valve would have an inlet pressure of approximately 140 psi and an outlet pressure of approximately 55 psi.

    - Install a PRV (Rosebrook Townhomes PRV) on the existing 10-inch diameter PVC main on Rosebrook Lane to reduce system pressures from the 2,010-storage tank grade line to the 1,810 well pump station grade line. The valve would have an inlet pressure of approximately 120 psi and an outlet pressure of approximately 35 psi.

    - Construct a new booster station (Crawford Ridge Booster Station) on the existing 12-inch diameter distribution main along Crawford Ridge Drive. This booster station is necessary to boost water from the proposed system grade line of 1,810 up to the highest user(s) in the Presidential Views development. A grade line of approximately 1,950 would be required to provide a static pressure of 45 psi at the highest user. The booster station would be located adjacent to Crawford Drive at an elevation of 1,710 +/-. The station would include multi-plex VFD centrifugal pumps and small hydropneumatic tank capable of maintaining system pressure and meeting the peak instantaneous demand of the residential units at Presidential Views and the higher elevations of Crawford Ridge. Since there is no storage downstream of the proposed booster station, an emergency generator and automatic transfer switch is recommended to maintain water supply in the event of a power outage. The booster station would be capable of fire flows with adequately sized pumps, and would be fitted with fire hydrants upstream and downstream for bypass as an additional safety measure.

    - Construct a new booster station (Mt. Washington Place Booster Station) on the existing 8-inch diameter distribution main along Hannah Loop. This booster station is necessary to boost water from the proposed system grade line of 1,810 up to the highest user(s) in the Dartmouth Ridge Homes development. A grade line of approximately 1,945 would be required to provide a static pressure of 45 psi at the highest user. The booster station would be located adjacent to Hannah Loop at an elevation of 1,680 +/-. The station would include

multi-plex VFD centrifugal pumps and hydropneumatic tank capable of maintaining system pressure and meeting the peak instantaneous demand of the residential units at Dartmouth Ridge Homes and the higher elevations of Mt. Washington Place. Like the Crawford Ridge station, there is no storage downstream, so an emergency generator and automatic transfer switch is recommended to maintain water supply in the event of a power outage. The booster station would be capable of fire flows with adequately sized pumps, and would be fitted with fire hydrants upstream and downstream for bypass as an additional safety measure.

- Construct a 350 linear foot eight-inch diameter water main extension from the end of Mt. Adams Lane cross country to Dartmouth Ridge Lane to connect two dead end mains. This connecting water main will provide pressure from the proposed Mt. Washington Place Booster Station to the higher users on Mt. Adams Lane and also improve water quality by removing dead ends.

- Install a new PRV at the intersection of Mt. Adams Lane and Hartford Lane to reduce system pressures from the 1,945-grade line to the 1,810-grade line. The valve would have an inlet pressure of approximately 105 psi and an outlet pressure of approximately 45 psi.

5. Basis of Design – There are two existing wells that supply the system. Well #1 pumps at a rate of 325 gpm, and Well #2 pumps at 425 gpm. Maximum static pressures in the lower elevation areas of the system approach 195 psi, and the pressures are the impetus for the project. Average daily flows during peak periods, during the winter ski season, are approximately 130,000 gallons per day. System flows and capacity will remain the same, as pressure reduction is the goal of the project. The system contains a 650,000-gallon concrete storage tank that provides extended storage and volume for firefighting capacity.

6. Opinion of Probable Cost - The opinion of probable cost (OPC) for the project is $2,645,000. The OPC includes engineering, administrative, legal, land/easement acquisition, construction and contingency costs. As breakdown of the various project components and their associated costs is attached for review and reference.

2021 Financing with NHDES - Rosebrook Pressure Reduction Project

System Improvements for Pressure Reduction per Horizon Engineering, Inc.'s Opinion of Probable Costs
plus Management's Determination of Additional costs plus Management's Determination of Additional Engineering and Construction Costs

Item	Total Costs	Allocation within Proj Item	Adjusted Total Costs	Allocation of Indirect Costs	Adjusted Total Costs	Management's Determination of Add'l Costs	Total Estimated Costs	Additional Estimated Costs	Adjusted Total Estimated Costs
General Conditions/Mobilization	$ 5,000		$ 5,000	$ (5,000)	$ -	$ -	$ -		
Well Pump Replacement									
Well #1 Vertical Turbine Pump	$ 15,000		$ 15,000	$ 5,748	$ 20,748	$ 5,003	$ 25,751	$ 13,170	$ 38,921
Well #2 Submersible Pump	15,000		15,000	5,748	20,748	5,003	25,751	13,170	38,921
Electrical / Controls	15,000		15,000	5,748	20,748	5,003	25,751	13,170	38,921
Mechanical / Piping	5,000		5,000	1,916	6,916	1,668	8,584	4,390	12,974
	$ 50,000	$ -	$ 50,000	$ 19,160	$ 69,160	$ 16,677	$ 85,837	$ 43,900	$ 129,737
Storage Tank Booster Station									
Building (16 Ft. x 18 ft.)	$ 57,600	$ 2,658	$ 60,258	$ 23,091	$ 83,349	$ 20,098	$ 103,447	$ 52,906	$ 156,353
Site Work / Grading	35,000	1,615	36,615	14,031	50,646	12,213	62,858	32,148	95,006
Driveway / Access	20,000	923	20,923	8,018	28,941	6,979	35,919	18,370	54,289
Electric Service	25,000	1,153	26,153	10,022	36,176	8,723	44,899	22,963	67,862
Pumps / Mechanical	45,000	2,076	47,076	18,040	65,116	15,702	80,818	41,333	122,151
Electrical	20,000	923	20,923	8,018	28,941	6,979	35,919	18,370	54,289
Emergency Generator	35,000	1,615	36,615	14,031	50,646	12,213	62,858	32,148	95,006
Piping / Valves	35,000	1,615	36,615	14,031	50,646	12,213	62,858	32,148	95,006
Telemetry / Controls	20,000	923	20,923	8,018	28,941	6,979	35,919	18,370	54,289
Connection to Existing	5,000	(5,000)	-	-	-	-	-		
Surface Restoration	7,500	(7,500)	-	-	-	-	-		
Erosion Control	1,000	(1,000)	-	-	-	-	-		
	$ 306,100	$ -	$ 306,100	$ 117,300	$ 423,400	$ 102,097	$ 525,497	$ 268,754	$ 794,251
Crawford Ridge Booster Station									
Building (14 Ft. x 16 ft.)	$ 44,800	$ 2,055	$ 46,855	$ 17,955	$ 64,810	$ 15,628	$ 80,438	$ 41,138	$ 121,577
Site Work / Grading	30,000	1,376	31,376	12,024	43,400	10,465	53,865	27,548	81,413
Driveway / Access	10,000	459	10,459	4,008	14,467	3,488	17,955	9,183	27,138
Electric Service	15,000	688	15,688	6,012	21,700	5,233	26,932	13,774	40,707
Pumps / Mechanical	35,000	1,606	36,606	14,028	50,633	12,209	62,842	32,139	94,982
Electrical	20,000	917	20,917	8,016	28,933	6,977	35,910	18,365	54,275
Emergency Generator	35,000	1,606	36,606	14,028	50,633	12,209	62,842	32,139	94,982
Piping / Valves	35,000	1,606	36,606	14,028	50,633	12,209	62,842	32,139	94,982
Telemetry / Controls	15,000	688	15,688	6,012	21,700	5,233	26,932	13,774	40,707
Connection to Existing	5,000	(5,000)	-	-	-	-	-		
Surface Restoration	5,000	(5,000)	-	-	-	-	-		
Erosion Control	1,000	(1,000)	-	-	-	-	-		
	$ 250,800	$ 0	$ 250,800	$ 96,109	$ 346,909	$ 83,652	$ 430,561	$ 220,201	$ 650,762
Mt. Washington Place Booster Station									
Building (14 Ft. x 16 ft.)	$ 44,800	$ 2,144	$ 46,944	$ 17,990	$ 64,934	$ 15,658	$ 80,592	$ 41,217	$ 121,809
Site Work / Grading	20,000	957	20,957	8,031	28,988	6,990	35,979	18,400	54,379
Driveway / Access	10,000	479	10,479	4,016	14,494	3,495	17,989	9,200	27,189
Electric Service	15,000	718	15,718	6,023	21,741	5,243	26,984	13,800	40,784
Pumps / Mechanical	35,000	1,675	36,675	14,054	50,730	12,233	62,962	32,201	95,163
Electrical	20,000	957	20,957	8,031	28,988	6,990	35,979	18,400	54,379
Emergency Generator	35,000	1,675	36,675	14,054	50,730	12,233	62,962	32,201	95,163
Piping / Valves	35,000	1,675	36,675	14,054	50,730	12,233	62,962	32,201	95,163
Telemetry / Controls	15,000	718	15,718	6,023	21,741	5,243	26,984	13,800	40,784
Connection to Existing	5,000	(5,000)	-	-	-	-	-		
Surface Restoration	5,000	(5,000)	-	-	-	-	-		
Erosion Control	1,000	(1,000)	-	-	-	-	-		
	$ 240,800	$ -	$ 240,800	$ 92,277	$ 333,077	$ 80,316	$ 413,393	$ 211,421	$ 624,814
Mt. Adams Lane Water Main Extension									
8 Inch Ductile Water Main	$ 31,500	$ 17,768	$ 49,268	$ 18,880	$ 68,148	$ 16,433	$ 84,581	$ 43,257	$ 127,838
Ledge Removal	11,250	(11,250)	-	-	-	-	-		
8 Inch Gate Valves	5,000	762	5,762	2,208	7,971	1,922	9,892	5,059	14,952
Connection to Existing	5,000	(5,000)	-	-	-	-	-		
Pavement Replacement	3,000	457	3,457	1,325	4,782	1,153	5,935	3,036	8,971
Hydrant	5,000	762	5,762	2,208	7,971	1,922	9,892	5,059	14,952
Surface Restoration	2,500	(2,500)	-	-	-	-	-		
Erosion Control	1,000	(1,000)	-	-	-	-	-		
	$ 64,250	$ -	$ 64,250	$ 24,621	$ 88,871	$ 21,430	$ 110,301	$ 56,411	$ 166,712
Pressure Reducing Valaves (Rosebroo Lane, Mt. Adams Lane)									
Pressure Reducing Valve Vaults	$ 20,000	$ 2,429	$ 22,429	$ 8,595	$ 31,023	$ 7,481	$ 38,504	$ 19,692	$ 58,196
Pressure Reducting Valves	15,000	1,821	16,821	6,446	23,268	5,611	28,878	14,769	43,647
Gate Valves / Bypass Piping	30,000	3,643	33,643	12,892	46,535	11,221	57,756	29,538	87,295
Connection to Existing	5,000	(5,000)	-	-	-	-	-		
Pavement Replacement	5,000	607	5,607	2,149	7,756	1,870	9,626	4,923	14,549
Traffic Control	1,500	(1,500)	-	-	-	-	-		
Surface Restoration	1,500	(1,500)	-	-	-	-	-		
Erosion Control	500	(500)	-	-	-	-	-		
	$ 78,500	$ -	$ 78,500	$ 30,082	$ 108,582	$ 26,183	$ 134,765	$ 68,923	$ 203,687
Subtotal Construction Costs	$ 995,450	$ 0	$ 995,450	$ 374,550	$ 1,370,000	$ 330,355	$ 1,700,355	$ 869,610	$ 2,569,965
15% Contingency	149,000	(3,450)	145,550	(145,550)	-	-	-		
Total Construction Costs	$ 1,144,450	$ (3,450)	$ 1,141,000	$ 229,000	$ 1,370,000	$ 330,355	$ 1,700,355	$ 869,610	$ 2,569,965
Land Easement	30,000		30,000		30,000	7,234	37,234	19,043	56,277
Legal	10,000		10,000		10,000	2,411	12,411	6,348	18,759
20% Engineering	229,000		229,000	(229,000)	-	-	-		
Total Project Costs	$ 1,413,450	$ (3,450)	$ 1,410,000	$ -	$ 1,410,000	$ 340,000	$ 1,750,000	$ 895,000	$ 2,645,000
Rounded Project Costs	$ 1,410,000								
Additional Engineering and Construction Costs								$ 895,000	

SPSt. Cyr
1/12/2021

The State of New Hampshire
Department of Environmental Services

Clark B. Freise, Assistant Commissioner

January 26, 2017

Alex Cranshaw
Abenaki Water Co.
37 Northwest Drive
Plainville, CT 06062

Subject: Rosebrook Water (0382010)
Pressure Reduction Project

Dear Mr. Cranshaw:

We understand that you are in the process of presenting drinking water system upgrades to the community. The biggest issue that you plan to address is the high pressure areas throughout the system and in some locations are high enough to pose safety concerns. A normal system pressure range recommended by this department is 60 to 80 psi, with a minimum and maximum of 35 psi and 100 psi, respectively. It is our understanding that the existing water system owned by Rosebrook Water can exceed 200 psi in some locations. This extremely high pressure creates a safety risk, increased water loss through water main breaks or leaks, increased operating costs, and the necessity of home pressure reducing valves (PRVs). You have also indicated that the system lost insurance coverage because of numerous claims caused by the excessive pressure.

We are in support of and recommend system modifications which will reduce the public health risk and will maintain pressures within the recommended range. Not only will this provide for a safer and less costly system to operate, it also creates the ability for the operating company to take back ownership of system maintenance from home and commercial owners who are currently maintaining their own PRVs.

If you have any questions, please do not hesitate to reach out to me at Randal.Suozzo@des.nh.gov or 271-1746.

Sincerely,

Randal A. Suozzo, P.E.
NHDES Drinking Water & Groundwater Bureau

ec: Don Vaughan, Abenaki Water Company

Twin Mountain Fire Department

Twin Mountain. Fire Department
PO Box 119
104 Route 3 North.
Twin Mountain, NH 03595

Phone: 603-846-5545
FAX: 603-278-7944
email: twinmountainfirerescue@townofcarroll.org

February 25, 2017

Mr. Donald J. T. Vaughan
Abenaki Water Company
37 Northwest Drive
Plainville, CT 06062

Re: Rosebrook Water System

Dear Mr. Vaughan:

The Twin Mountain Fire Department is a municipal department providing fire protection services for Bretton Woods, served by the Rosebrook water system. As presently configured, the Rosebrook system has pressures as high as 200 psi in some areas. This pressure is excessively high and potentially dangerous from the perspective of operating fire hydrants and other equipment. Typically, municipal systems operate between 50 and 75 psi which is generally adequate for fire fighting purposes.

As the current owner and operator of the Rosebrook system, Abenaki has presented a plan for improvements to the system that would lower the maximum pressure to 100 psi while still maintaining adequate fire flows. The Twin Mountain Fire Department supports this project and believes that it would improve safety and reliability of the system.

Respectfully,

Jeremy Oleson
Fire Chief

Cc: TMFD - File

SYSTEM EVALUATION FOR PRESSURE REDUCTION

Rosebrook Water Company

Bretton Woods, New Hampshire

SYSTEM EVALUATION FOR PRESSURE REDUCTION
ROSEBROOK WATER COMPANY
BRETTON WOODS, NEW HAMPSHIRE
FOR
ABENAKI WATER COMPANY
PLAINVILLE, CT

JULY 2016

Project No. 16134
Horizons Engineering, Inc.

17 Sunset Terrace
Newport, VT 05855
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34 School Street
Littleton, NH 03561
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New London, NH 03257
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Project No. 16134
July 15, 2016

Messrs. Donald Vaughan and Thomas Hansen
Abenaki Water Company
7 Northwest Drive
Plainville, CT 06062
(860) 747-1665

Subject: Rosebrook Water Company – System Evaluation for Pressure Reduction

Dear Mr. Vaughan and Mr. Hansen:

In accordance with our agreement dated May 11, 2016 and your Purchase Order #1926, we have completed an evaluation for the reduction in system pressures in the Rosebrook Water system in Bretton Woods, New Hampshire. This effort was completed to address significant concerns related to high system pressures and the effect those pressures have had on the system, including premature material and equipment failures and lengthy losses in potable water service and fire protection. System pressure reduction is important to improve system reliability and reduce risk for system operators, users, and the public at large.

If you have any questions or need any additional information, please feel free to call. Thank you for the opportunity to be of service.

Sincerely,

Stephen M. LaFrance, P.E.
Principal Engineer
Horizons Engineering, Inc.

T:\16134 New England Service Co - Rosebrook Water\DOCS\Reports\Rosebrook Water Utility Report.doc

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APPENDICES

System Overview/Components

The Rosebrook Water Company, Inc. operates the Rosebrook Water System (PWS ID 0382010) to provide domestic water supply and fire suppression to users in Bretton Woods, New Hampshire. The system serves the Mount Washington Hotel and Bretton Woods Ski Resort complex as well as single and multi-family residential and small commercial customers within the service area. The Rosebrook Water System is designated by the New Hampshire Department of Environmental Services (NHDES) as a Large Community Water System (a public water system serving a population greater than 1,000 or providing flow for fire suppression). NHDES records indicate the system serves a population of 1,050 through 408 services connections. Major system components include two gravel packed production wells, a pump house, a 650,000 gallon atmospheric storage tank, and distribution piping and appurtenances.

Wells and Well Field

The system has two sand and gravel production wells located to the north of the Bretton Woods Base Lodge and to the south of Drummond Mountain Shop on Route 302.

Well #1 is a 43 foot deep gravel-packed production well with a reported yield of 322 gallons per minute and a static water level of approximately 6 feet below ground surface. Well #1 was installed in 1970 during the original construction of the water system and is located inside the pump station building. Currently Well #1 is equipped with an American Industrial 50 horsepower 10-stage vertical turbine pump. This pump has a reported pumping capacity of approximately 325 gallons per minute. As Well #1 was installed prior to adoption of NHDES Groundwater Withdrawal Rules Env-Ws 379 and 388, this well has not been assigned a permitted production volume.

Well #2 is a 52 foot deep gravel packed production well with a reported yield of 450 gallons per minute. The well is located approximately 90 feet to the southeast of the pump station. Well #2 was installed in the 1990s and received NHDES Conditional Approval in July of 2003. The well is currently equipped with a Goulds 60 horsepower, 480-volt, 3-phase pump set at 30 feet, with an estimated pumping capacity of 425 gallons per minute. NHDES has assigned Well #2 a daily permitted production volume of 540,000 gallons (375 gallons per minute based on continuous pumping)

Pump Station

The Rosebrook pump station consists of a single-story metal-framed building constructed on a concrete slab. The building is in good condition, having been rebuilt after a piping failure and flooding incident in 2008. The pump station does not contain any booster pumps or hydropneumatic storage. The well pumps are configured to operate based on water level in the atmospheric storage tank. These pumps provide the sole source of head for the system. The pump station building houses the Well #1 well head and drive motor along with a chemical feed pump for water treatment, system controls and alarms for both wells, and various tools, spare parts, and supplies.

Atmospheric Storage Tank

Atmospheric storage consists of a single partially buried cast in place concrete storage tank with a metal truss roof, constructed in the early 1970s. The tank is ninety feet in diameter and has a capacity of 650,000 gallons. The tank is located within the Bretton Woods Ski Area at an approximate elevation of 2,010 feet. Within the last 15 years the tank has undergone repairs to address deterioration of the roof, including installation of a new roof covering system of polystyrene insulation and EPDM membrane in 2012.

Distribution System

The system consists primarily of cement-lined ductile iron and C900 PVC water mains. The system contains a total of approximately 32,600 feet of water main. Service connections consist primarily of type "K" copper with brass fittings. System pressures reportedly range from 50 to 185 pounds per square inch. Service connections at lower elevations are equipped with individual pressure reducing valves. The system is equipped with fire hydrants for fire suppression and water mains appear to be adequately sized to provide fire flow. Some of the gate valves in the system (e.g. the 16 inch valve at the intersection of Route 302 and the Cog Railway Base Road) are inoperable.

System Demands

Pumping records are maintained for the two water supply wells and are provided in Appendix C. Average daily demand over the 2015 calendar year was approximately 110,000 gallons. The peak month was January with an average daily demand of 131,616 gallons and a peak pumping day of 279,900 gallons on January 31, 2015.

System Pressures

Due to the significant grade differential between the lower service areas and the operating level of the atmospheric storage tank, parts of the Rosebrook system have very high static and working pressures. As noted earlier, the storage tank is located at elevation 2010+/-. Elevations along Route 302 and the Base Road near the intersection with Route 302 are approximately 1,575, resulting in static water system pressures in excess of 180 psi. The elevation at the end of River's Edge Road, one of the lowest points on the system, is 1570, with static pressures of nearly 190 psi.

These high system pressures have caused issues in the past including failed hydrants, isolation valves, and service connections. Although there are design and operational considerations that must be addressed with any plan to reduce system pressures, there are legitimate concerns with current operations. The high pressures are a safety concern, result in excessive wear and tear on pumping equipment, piping, and appurtenances, and lead to premature equipment and material failures. There have been several severe leaks as a result of high system pressures, including a catastrophic failure of a fitting in the well pump station that resulted in loss of potable water and fire protection throughout the system for an extended period of time. The repairs were very costly (over $100,000) and not covered by insurance. There are also a number of valves in the

system that either do not function at all, or are only partially operable due to high system pressures.

These issues can be expected to continue and likely worsen as time goes on and system components age. These failures will at times lead to loss of potable water service and fire protection, which puts the users and residents at risk.

If system pressures can be effectively reduced, it will result in a system that is safer to operate, some operation and maintenance and pumping costs will be reduced, there will be less reliance on individual service pressure reducing valves (PRVs) for system control, and system leakage will be reduced.

Over the years there have been discussions about system modifications to reduce operating pressures. Assuming that the wells, pump station, atmospheric storage tank, and transmission main(s) remain in their present locations because of the large capital investment and cost to relocate, the installation of PRVs has been considered the most viable alternative. The installation of PRVs would require one or more booster stations to re-pressurize the system to reach existing higher elevation service connections.

The backbone of the system is the existing 16 inch diameter ductile iron transmission main the connects the well pump house on the north side of the Ammonoosuc River behind the Drummond Mountain Shop to the atmospheric storage tank to the south at the Bretton Woods Ski Area. There are a number of interconnections off this transmission main that act both as direct service connections (e.g. the Ski Lodge), as well as distribution mains to the Crawford Ridge/Presidential View/Riverfront developments, Rosebrook Townhomes, and Forest Cottages. Just outside the pump house, there is a tee to a 16 inch diameter ductile iron main the passes under Route 302 and along the Cog Railway Base Road and services the residential developments to the west as well as the Mt. Washington Hotel complex.

Concerns Related to Reduction in System Pressure

There are three primary concerns related to reducing system pressures; summarized as follows:

<u>Impact on existing high elevation users</u>
There are several existing residential developments at higher elevations on the system. The uppermost residential building at the Mountain View development is at a ground elevation of 1,810, which equates to a current static pressure of 85 psi. The uppermost residential building at Dartmouth Ridge Homes is at a ground elevation of 1,825, which equates to a current static pressure of 80 psi. The uppermost residential unit at Presidential Views is at a ground elevation of 1,845, which equates to a current static pressure of 70 psi.

New Hampshire Department of Environmental Services Drinking Water & Groundwater standards require a typical minimum residual pressure of 35 psi and an absolute minimum operating pressure of 20 psi (typically under rare fire flow conditions). Assuming at present that Presidential Views is the controlling development, system pressures could be lowered approximately 25 psi and still meet NHDES standards without the need to re-pump. This

estimate is based simply on relative elevations and static pressure conditions and would need to be confirmed with flow testing and hydraulic modeling.

Impact on existing fire flows and sprinkler flows

Reduction in operating pressure will reduce available fire flows throughout the system. Reductions will likely not be of consequence at lower elevations with high operating pressures, but will become more significant at the higher elevations at the ends of the system. Should the decision be made to further evaluate reductions in system pressure, hydrant flow testing and hydraulic modeling of the system at key locations such as at Presidential View, Dartmouth Ridge Homes and Stone Hill is recommended to ensure adequate fire flows are maintained. Given the high service pressures at present and the intent to provide a 100-120 psi ceiling pressure, maintenance of sufficient fire flows is not expected to be difficult.

The larger commercial buildings on the system such as the Mt. Washington Hotel, the Bretton Arms, the Golf/Nordic Center, the Bretton Woods Ski Area Base Lodge, etc. are protected by sprinkler systems that rely on the Rosebrook system for supply. These systems were originally designed based on existing system pressures. The effect of reduced system pressures should be evaluated to ensure that adequate sprinkler flows are maintained. Several calls have been placed to Mr. Kolin Bailey, Director of Engineering at Omni Hotels, for information regarding the system designs and operating parameters. A return call has not been received to date.

Impact on future development at high elevation

The Rosebrook water system was originally constructed to support development of the Bretton Woods Ski Area and associated residential and commercial development. Water main extensions and system upgrades have been made periodically to extend service to new developments and in some cases such as the extension to the Mt. Washington Hotel, to existing developments and structures that abandoned previous water supplies.

A significant amount of undeveloped land remains within the likely service area of the Rosebrook system. Plans have been developed to extend service on Crawford Ridge Road beyond the existing Presidential Views residences into the Town of Bethlehem. This development could extend up to elevation 1900, which would require all the system pressure currently provided by the system.

Plans have also been prepared for residential development to the north of the Base Road, above Dartmouth Ridge Homes. A copy of a subdivision and phasing plan prepared for Bretton Woods Land Co., LLC in 2009 can be found in Appendix B. This development extended to high elevations that also would need system pressures as they exist today. The uppermost and most northerly lot in the proposed development (DB-141) was identified as a future atmospheric storage tank location. The tank was intended to be set at the same elevation as the existing storage tank (2,010+/-) to provide additional storage and fire protection. The first phase of the development was fully designed and permitted but was not constructed due to a downturn in the economy, and remains a possibility in the future.

Conceptual Improvements for Pressure Reduction

At the direction of the system owner, a conceptual plan has been developed to reduce system pressures to a target maximum of 100 psi static. The plan maintains key components of the existing system such as the two gravel production wells, the transmission and distribution mains, and the 650,000 gallon atmospheric storage tank in the present locations to minimize disruption and project cost. The key components of the improvements are shown on the site plan in Appendix D and outlined as follows:

- Replace existing well pumps in Well #1 and Well #2 with two new well pumps capable of the same flow rates (325 gpm for Well #1 and 425 gpm for Well #2) at a discharge pressure of 100 psi. This will reduce the system pressure at the pump station from approximately 185 psi to 100 psi at a new system grade line of 1,810 +/-. The well pumps will continue to be controlled by the water level(s) in the 650,000 gallon atmospheric storage tank.

- Construct a new booster station on the existing 16 inch diameter transmission main from the pump station to the storage tank (see Storage Tank Booster Station on plan in Appendix D). This booster station is necessary to boost water from the proposed system grade line of 1,810 up to the existing storage tank elevation of 2,010 +/-. The booster station would be located adjacent to the Rosebrook Townhomes residential development at an elevation of 1,680 +/-. The station must be located below the distribution mains to Rosebrook Townhomes and Mountain Views to allow those developments to utilize the 2,010 storage tank grade line. The station would have duplex centrifugal pumps capable of 425 gallons per minute to match the output of Well #2. The booster station would be controlled by water level(s) in the atmospheric storage tank and would start and stop in conjunction with the well pumps.

- Install a bypass line and pressure reducing valve (PRV) in the Storage Tank Booster Station to allow water from the storage tank to back feed and supply the Rosebrook system. The valve would have an inlet pressure of approximately 140 psi and an outlet pressure of approximately 55 psi.

- Install a PRV (Rosebrook Townhomes PRV) on the existing 10 inch diameter PVC main on Rosebrook Lane to reduce system pressures from the 2,010 storage tank grade line to the 1,810 well pump station grade line. The valve would have an inlet pressure of approximately 120 psi and an outlet pressure of approximately 35 psi.

- Construct a new booster station (Crawford Ridge Booster Station) on the existing 12 inch diameter distribution main along Crawford Ridge Drive. This booster station is necessary to boost water from the proposed system grade line of 1,810 up to the highest user(s) in the Presidential Views development. A grade line of approximately 1,950 would be required to provide a static pressure of 45 psi at the highest user. The booster station would be located adjacent to Crawford Drive at an elevation of 1,710 +/-. The station would include multi-plex VFD centrifugal pumps and small hydropneumatic tank capable of maintaining system pressure and meeting the peak instantaneous demand of

the residential units at Presidential Views and the higher elevations of Crawford Ridge. Since there is no storage downstream of the proposed booster station, an emergency generator and automatic transfer switch is recommended to maintain water supply in the event of a power outage. The booster station would be capable of fire flows with adequately sized pumps, and would be fitted with fire hydrants upstream and downstream for bypass as an additional safety measure.

- Construct a new booster station (Mt. Washington Place Booster Station) on the existing 8 inch diameter distribution main along Hannah Loop. This booster station is necessary to boost water from the proposed system grade line of 1,810 up to the highest user(s) in the Dartmouth Ridge Homes development. A grade line of approximately 1,945 would be required to provide a static pressure of 45 psi at the highest user. The booster station would be located adjacent to Hannah Loop at an elevation of 1,680 +/-. The station would include multi-plex VFD centrifugal pumps and hydropneumatic tank capable of maintaining system pressure and meeting the peak instantaneous demand of the residential units at Dartmouth Ridge Homes and the higher elevations of Mt. Washington Place. Like the Crawford Ridge station, there is no storage downstream, so an emergency generator and automatic transfer switch is recommended to maintain water supply in the event of a power outage. The booster station would be capable of fire flows with adequately sized pumps, and would be fitted with fire hydrants upstream and downstream for bypass as an additional safety measure.

- Construct a 350 linear foot eight inch diameter water main extension from the end of Mt. Adams Lane cross country to Dartmouth Ridge Lane to connect two dead end mains. This connecting water main will provide pressure from the proposed Mt. Washington Place Booster Station to the higher users on Mt. Adams Lane and also improve water quality by removing dead ends.

- Install a new PRV at the intersection of Mt. Adams Lane and Hartford Lane to reduce system pressures from the 1,945 grade line to the 1,810 grade line. The valve would have an inlet pressure of approximately 105 psi and an outlet pressure of approximately 45 psi.

Opinion of Probable Project Cost for Improvement Options

An opinion of probable project cost has been prepared and included in Appendix E. The opinion includes an estimate of construction cost as well as a 15% contingency and an allowance for soft costs including land, legal fees, administration, and engineering.

Conclusions and Recommendations

The Rosebrook system currently operates with working pressures that are excessive. The working pressures pose a potential safety hazard and lead to premature wear and failure of equipment, piping, and appurtenances. System pressures can be reduced to a maximum of 100-120 psi with the installation of pressure reducing valves in key locations in the system. Due to

the broad elevation changes in the service area, pressure reductions must be countered with booster stations to continue to adequately serve higher elevation service connections.

The conceptual design that has been prepared envisions new well pumps and controls to reduce the system pressure at the well pump station from 185 psi to 100 psi. In addition, three booster stations and three pressure reducing valves are proposed to provide a minimum of approximately 45 psi static pressure to all existing users on the system. Finally, a 350 linear foot water main extension/connection is proposed to provide service to high elevation users in Dartmouth Brook. The total estimated cost for the proposed improvements is $1,410,000 including contingency and soft costs.

As Rosebrook Water Company, Inc. evaluates the proposed project further, we recommend the following:

- Conduct a review of existing sprinkler system flow requirements and hydrant fire flow requirements at key locations in the system.

- Confirm interpolated elevations for the existing storage tank and proposed booster station and PRV locations.

- Determine allowable system pressure reduction through hydrant testing and hydraulic modeling.

- Investigate options for booster station locations and required land purchases.

- Prepare preliminary design for the well pumps, pressure reducing valves, booster stations, water main connection, etc. to provide desired system pressures and flows.

- Revise opinions of probable project cost for the proposed improvements based on the refined designs.

Scheduling of Improvements

The proposed improvements are inextricably linked and must be completed together for the system to function properly. The booster pump stations (Storage Tank Booster Station, Mt. Washington Place Booster Station, and Crawford Ridge Booster Station) must be installed and operational before system pressures are reduced with a change in well pumps or the installation of the PRVs. Once the stations are installed, system pressures can be maintained at the higher elevations and lowered to the maximum target pressure of 100 +/- psi in the lower elevations.

Design and permitting can be expected to take approximately 90 days to complete. Construction of the booster stations would require an additional 90 days. Well pumps and pump station modifications, PRV vault installations, and the proposed eight inch diameter water main connection on Mt. Adams Lane could be accomplished in approximately 45 days.

APPENDIX A
Rosebrook Water Company, Inc.
Customer Meter Size and Type

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+	Customer	Customer Type	Register ID:	Meter Size	Meter Type
COMMERCIAL:	200A BW Irving Store	Commercial	08664141	5/8"	Sensus
	201 Drummonds Ski Shop	Commercial	NO REMOTE	5/8"	Sensus-old
Total: 3	203 Real Estate Office/Peabody & Smith	Commercial	NO REMOTE	5/8"	Rockwell
HOTEL & ENTITIES:	202 Hotel-Omni Mt Wash Hotel	Hotel Entity	EBCS6EB	6"	Badger
	BW Admin Blg.	Hotel Entity	NO REMOTE	1"	Sensus
	BW Alpine Club-KITCHEN	Hotel Entity	NO REMOTE	1"	Sensus
	BW Apline Club-BATHRM TRAILER	Hotel Entity	73296636	5/8"	Sensus
	BW Arms	Hotel Entity	45862316	1"	Badger
	BW Caretakers Home	Hotel Entity	ANALOG	5/8"	
	BW Fabyans	Hotel Entity	NO REMOTE	5/8"	ICE?
	BW First Aid Blg	Hotel Entity	NO REMOTE	5/8"	Sensus
	BW Golf/Nordic Building	Hotel Entity	45862318	1"	Badger
	BW O/D Pool & Cabana	Hotel Entity	63408013	2"	Sensus
	BW Ski Area	Hotel Entity	NO REMOTE	2"	
	BW Ski Area-Maintenance Blg	Hotel Entity	35986259	5/8"	Badger
	BW Spa Building	Hotel Entity	02925660	3"	Sensus
	BW Sports Club/Rosebrook Rec Center	Blg. Closed removed meter			
	BW Stables	Hotel Entity	35986245	5/8"	Badger
	BW #337123 portable hydrant meter	Hotel Entity	337123	3"	Sportster
Total: 14 + 2 hydrant meters	BW #337124 portable hydrant meter	Hotel Entity	337124	3"	Sportster
CRAWFORD RIDGE:	CR01 Nelson, George & Kirsten	Active	51946552	5/8"	Sensus
	CR02 Banks, Clarence & Maria	Active	51946535	5/8"	Sensus
	CR03 Shumakin, Kosta & Helena	Active	51946534	5/8"	Sensus
	CR04 Revers, Daniel & Lise	Active	51946551	5/8"	Sensus
	CR05 Benoit, Michael & Donna	Active	51946537	5/8"	Sensus
	CR06 Smail, Peter & Maria	Active	51946554	5/8"	Sensus
	CR07 Milligan, Michael	Active	51946555	5/8"	Sensus
	CR08 Hanson, Michael & Janet	Active	51946550	5/8"	Sensus
	CR09 Relyea, Douglas & Kathleen	Active	57079494	5/8"	Sensus
	CR10 McGloin, Jonathan & Sherry	Active	ANALOG	5/8"	Sensus
	CR11 Foti, Alessandro	Active	63518471	5/8"	Sensus
	CR12 Thomas, Jo-Ellen	Active	06892404	5/8"	Sensus
	CR13 Potter, Brian & Robin	Active	55988888	5/8"	Sensus
	CR14 Baker, Scott	Active	55988889	5/8"	Sensus
	CR15 Southworth & Saisa	Active	13098704	5/8"	Sensus
	CR16 Toran, Richard & Ann	Active	13213198	5/8"	Sensus
	CR17 Falvey-Vantangoli, Karen	Active	09929294	5/8"	Sensus

Meter Count
5/8" = 361
1" = 45
2" = 2
3" = 3
6" = 1
Total: 412

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+		Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
		CR18 McSherry, Stephen & Christine	Active	09980563	5/8"	Sensus	
		CR19 Farrell, Daniel & Sue	Active	63518475	5/8"	Sensus	
		CR20 Van Fleet, Bruce & Lisa	Active	09965987	5/8"	Sensus	
		CR21 Alphas Trust	Active	08635889	5/8"	Sensus	
	Total: **22**	CR22 Beauchesne, Bryan & Danielle	Active	08648465	5/8"	Sensus	
DARTMOUTH RIDGE:		DR01 Formisano, Ed & Mary Louise	Active	59616024	5/8"		
Single Family Homes		DR02 Birknes	Active	52214174	5/8"		
		DR03 Vaughan, Patrick & Kathleen L.	Active	52512379	5/8"		
		DR05 Oliver, Al & Connie	Active	09562834	5/8"		
		DR10 Perry & Gilmore	Active	09819852	5/8"		
		DR11 Schiess, Reed	Active	52862855	5/8"		
		DR12 Finn, Michael & Linda	Active	52214173	5/8"		
		DR13 Whitton, Richard & Barbara	Active	52214171	5/8"		
		DR16 Miller, Bode	Active	58207872	1"	Sensus	
		DR17 Manning, Robert & Donna	Active	52512383	5/8"		
		**DR17a Manning/2nd meter	Active	35986244	5/8"	Badger	
		DR20 Whalen, Charles	Active	35986241	5/8"	Badger	
		DR26 Infanti, James & Kathi	Active	62266802	1"	Sensus	
		DR27 Sullivan, Mark & Cheryl	Active	73296638	5/8"	Sensus	
	Total: **15**	DR29 Shea, Michael & Kathleen	Active	72933995	5/8"	Sensus	
FOREST COTTAGE:		FC01 Wirth, Cathy	Active	71003801	5/8"	Elster	
		FC02 Wirth, Theodore & Cathy	Active	ANALOG	5/8"		
		FC03 Hurley, David & Elaine	Active	57519013	5/8"		
		FC04 Torres & Foltz	Active	61135339	5/8"		
		FC05 Buras, Jennifer	Active	57519060	5/8"		
		FC06 Rose, Tony	Active	73296633	5/8"	Sensus	
		FC07 Grossman & Coyle	Active	ANALOG	5/8"		
		FC08 George, Philip & Denise	Active	7326632	5/8"	Sensus	
		FC09 Kloeblen, Steve	Active	ANALOG	5/8"		
		FC10 Luongo, Paul & Marilyn	Active	ANALOG	5/8"		
		FC11 Dunham, Donald & Joan	Active	ANALOG	5/8"		
		FC12 George, Philip & Denise	Active	ANALOG	5/8"		
		FC13 Crimmins & Robinson	Active	ANALOG	5/8"		
		FC14 George, Philip & Denise	Active	ANALOG	5/8"		
		FC15 Forrest, Michael & Janice	Active	ANALOG	5/8"		
		FC16 Dunham, Donald & Joan	Active	52512392	5/8"		
		FC17 Eland, Alan & Joanne	Active	ANALOG	5/8"		

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+		Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
		FC18 Wilson, Robert & Joan	Active	ANALOG	5/8"		
		FC19 Johnson, Karl & Paulette	Active	71003785	5/8"	Elster	
		FC20 Barous, Frank	Active	ANALOG	5/8"		
		FC21 McMorrow, Daniel & Marianne	Active	7003921	5/8"		
		FC22 Remondi, Stephen & Kristen	Active	ANALOG	5/8"		
		FC23 Grayson, John & Lori	Active	57079497	5/8"		
		FC24 Molleur, Danielle	Active	ANALOG	5/8"		
		FC25 Stevenson & Brewer	Active	ANALOG	5/8"		
		FC26 Charette, George & Karen	Active	ANALOG	5/8"		
		FC27 Gill, Kevin & Rita	Active	08659844	5/8"		
		FC28 Jones, Jay & Debra	Active	ANALOG	5/8"		
		FC29 Fournier/"F Camp Family Trust"	Active	54968898	5/8"		
		FC30 Giannelli, Tom & Andrea	Active	ANALOG	5/8"		
		FC31 Johnson, Gary	Active	ANALOG	5/8"		
		FC32 Losordo, Peter & Karen	Active	ANALOG	5/8"		
		FC33 Penacho Family Trust	Active	54968901	5/8"		
		FC34 Botsivales, Greg	Active	ANALOG	5/8"		
		FC35 Ferguson, Paul & Amy	Active	ANALOG	5/8"		
		FC36 Lees, John & Pam	Active	ANALOG	5/8"		
		FC37 Quinlan, Kevin & Joanna	Active	ANALOG	5/8"		
		FC38 Graves, John & Suzanne	Active	ANALOG	5/8"		
		FC39 Ricciardi, Bernadette	Active	ANALOG	5/8"		
		FC40 JJZM Investment Co. LLC	Active	ANALOG	5/8"		
		FC41 San Antonio, Richard & Pamela	Active	62018055	5/8"		
		FC42 Dwyer, Lawrence	Active	62018058	5/8"		
		FC43 Rani Realty Trust	Active	54968899	5/8"		
		FC44 Osborn, Jason & Karen	Active	ANALOG	5/8"		
		FC45 Mongeau, Paul & Deborah	Active	ANALOG	5/8"		
		FC46 Schaier, Warren & Sandy	Active	ANALOG	5/8"		
		FC47 Blanchard, Ronald & Diane	Active	ANALOG	5/8"		
		FC48 Murphy, Henry & Mary	Active	ANALOG	5/8"		
		FC49 Barr, James & Jane	Active	ANALOG	5/8"		
		FC50 McQueeney, Owen & Sue	Active	ANALOG	5/8"		
		FC51 Penner, Terry & Michele	Active	72933994	5/8"	Sensus	
		FC52 Miller, Jeffery & Cynthia	Active	ANALOG	5/8"		
		FC53 Squires, Bob & Robin	Active	ANALOG	5/8"		
	Total: 54	FC54 Hatch, William & Marguerite	Active	61135340	5/8"	Sensus	
FAIRWAY VILLAGE:		FV01 Monica & Horan	Active	07193974	5/8"	Sensus	

Rosebrook Water Company Inc.
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Association/Business+	Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
	FV02 Keane, Brian & Theresa	Active	06894980	5/8"	Sensus	
	FV03 Apple, Leslie	Active	ANALOG	5/8"	Rockwell	
	FV04 Harmon, Robert & Rose Ellen	Active	ANALOG	5/8"	Rockwell	
	FV05 Keyser, Donald & Anne	Active	54949860	5/8"	Sensus	
	FV06 Dolan & Connly	Active	54949865	5/8"	Sensus	
	FV07 Mueller, Andreas & Birgit	Active	08907595	5/8"	Sensus	
	FV08 Gibson, Jay & Mary Pat	Active	07172591	5/8"	Sensus	
	FV09 Mordecai & Robbins	Active	54949862	5/8"	Sensus	
	FV10 Dirsa, Albert & Elise	Active	54949863	5/8"	Sensus	
	FV11 Seager, John S. & Linda	Active	07048024	5/8"	Sensus	
	FV12 Daft, Ed & Lisa	Active	07189359	5/8"	Sensus	
	FV13 St. Sauveur, Ronald & Susan	Active	ANALOG	5/8"	Rockwell	
	FV14 Ashe, Terry & Megan	Active	ANALOG	5/8"	Rockwell	
	FV15 Early, Jim & Jane	Active	55988881	5/8"	Sensus	
	FV16 Cox, Gregory & Alisha	Active	55323173	5/8"	Sensus	
	FV17 Cary, Lee B.	Active	07208121	5/8"	Sensus	
	FV18 Cary, Lee B.	Active	07212535	5/8"	Sensus	
	FV19 Pasalic, Sandi & Sener	Active	55323169	5/8"	Sensus	
	FV20 Sweeney, John & Dianne	Active	55322348	5/8"	Sensus	
	FV21 KIGS Enterprises/Kammann	Active	ANALOG	5/8"	Sensus	
	FV22 Molloy, Tracey	Active	ANALOG	5/8"	Sensus	
	FV23 Apple, Roy & Sharon	Active	62018057	5/8"	Sensus	
	FV24 Renner & Kirsch	Active	54968897	5/8"	Sensus	
	FV25 Bauchspies, Barbara	Active	55323174	5/8"	Sensus	
	FV26 Blanche, Jeremy & Julie	Active	09519611	5/8"	Sensus	
	FV27 Poche, Michael & Marjorie	Active	ANALOG	5/8"	Rockwell	
	FV28 O'Brien, Joseph	Active	ANALOG	5/8"	Rockwell	
	FV29 Apple, Fred & Jan	Active	57518568	5/8"	Sensus	
	FV30 Grondine, Leo & Maryann	Active	57518572	5/8"	Sensus	
	FV31 Urban, Steven & Maria	Active	57409106	5/8"	Sensus	
	FV32 Polinger, Shirley	Active	54968902	5/8"	Sensus	
	FV33 Hague & Hanley	Active	ANALOG	5/8"	Rockwell	
	FV34 Hahesy, Paul & Geralyn	Active	57409105	5/8"	Sensus	
	FV35 Elwell, Leon & Carol	Active	ANALOG	5/8"	Rockwell	
	FV36 Caterine, John & Melinda	Active	73296637	5/8"	Sensus	
	FV37 Roy, David & Jessica	Active	57409109	5/8"	Sensus	
	FV38 Bencivenga, Anthony & Lynn	Active	ANALOG	5/8"	Rockwell	
	FV39 Koplow, Meyer	Active	ANALOG	5/8"	Rockwell	
	FV40 Koplow, Meyer	Active	ANALOG	5/8"	Rockwell	

Rosebrook Water Company Inc.
Customer Meter Size & Type
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Association/Business+	Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
	FV41 Trott, John & Tracey	Active	ANALOG	5/8"	Rockwell	
	FV42 Long & Brewer	Active	35975334	5/8"	Badger	
	FV43 Fusco, Theresa	Active	ANALOG	5/8"	Rockwell	
	FV44 Heath, Jack & Patty	Active	ANALOG	5/8"	Rockwell	
	FV45 Spinello, John A.	Active	ANALOG	5/8"	Rockwell	
	FV46 Lawson, Richard & Barbara	Active	ANALOG	5/8"	Rockwell	
	FV47 Corkery, Tim & Linda	Active	73296635	5/8"	Sensus	
	FV48 Gaudette, Eugene	Active	ANALOG	5/8"	Rockwell	
	FV49 St. Peter, Robert	Active	ANALOG	5/8"	Rockwell	
Total: 50	FV50 Latimer, Chris E. & Patricia	Active	ANALOG	5/8"	Rockwell	
MT. WASHINGTON HOMES:	MH01 Hegarty, Christopher & Joyce	Active	52862854	5/8"	Sensus	
Single Family Homes	MH03 Dopfel, Alan	Active	62266803	1"	Sensus	
	MH08 Rhodes, Matthew & Cindy	Active	62033392	1"	Sensus	
	MH12 Reynolds, Donald & Donna	Active	02623851	5/8"		
	MH14 Strasser, Allen	Active	56143451	1"	Sensus	
	MH16 Xue, Mei	Active	52862856	5/8"	Sensus	
	MH19 Woods, William & Lila	Active	52862859	5/8"	Sensus	
	MH20 Glendon, David	Active	52862857	5/8"		
Total: 9	MH21 Atkinson, Gaynor	Active	62033391	1"	Sensus	
MT. MADISON:	MM01 Griner, Gregg & Maria	Active	54884729	1"	Sensus	
	MM02 Gaton, Richard J.	Active	54884728	1"	Sensus	
	MM03 Cargill, William & Alicia	Active	54413057	1"	Sensus	
	MM04 Koplow, Meyer	Active	54413058	1"	Sensus	
	MM05 Weisman, Robert & Vanessa	Active	61116194	1"	Sensus	
	MM06 Berger, James & Lisa	Active	58207873	1"	Sensus	
	MM07 Tang & Kainz	Active	58207875	1"	Sensus	
	MM08 O'Shea, Timothy & Corinne	Active	58207876	1"	Sensus	
	MM09 Borek, Robert & Beth	Active	54884736	1"	Sensus	
Total: 10	MM10 Collins, Christoper & Sandra	Active	54884735	1"	Sensus	
MOUNTAIN VIEW:	MV101 Festa, Michael & Martha	Active	09658680	5/8"	Sensus	
fka: Rosebrook Club	MV102 Skilton, Brian & Deirdre	Active	09572422	5/8"	Sensus	
	MV103 Mueller, Paul & Deborah	Active	09572419	5/8"	Sensus	
	MV104 Atkinson, Gaynor	Active	09574445	5/8"	Sensus	
	MV201 Sullivan, Michael	Active	12949758	5/8"	Sensus	
	MV202 Ryan, Michele	Active	12811289	5/8"	Sensus	
	MV203 Donahue, John & Patricia	Active	12953265	5/8"	Sensus	

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+	Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
	MV204 Waugh, Scott & Kimberly	Active	12877800	5/8"	Sensus	
	MV301 Alphas, John & Sharon	Active	30267357	5/8"	Sensus	
	MV302 Smith, Joseph & Mary Jo	Active	63518480	5/8"	Sensus	
	MV303 Morris, Peter & Heather	Active	63518479	5/8"	Sensus	
	MV304 Leeman & McLaughlin	Active	30267368	5/8"	Sensus	
	MV401 Pappalardo, Karen	Active	51946553	5/8"	Sensus	
	MV402 Casey, Mark	Active	51946532	5/8"	Sensus	
Total: 15	MV403 Page & Trahan	Active	51367085	5/8"	Sensus	
MT. WASHINGTON PLACE:	MW01 PiSierra & O'Connor	Active	55751688	5/8"		
	MW02 Falkenberry, Stephen & Allison	Active	08635770	5/8"		
	MW03 Coffman, David & Barbara	Active	57518666	5/8"		
	MW04 Korona, John & Kathleen	Active	ANALOG	5/8"		
	MW05 Scheidemantel & Boatwright	Active	ANALOG	5/8"		
	MW06 Taylor, Kim	Active	52512396	5/8"		
	MW07 Mullins, James & Eileen	Active	ANALOG	5/8"		
	MW08 McGoldrick, Neil & Amy	Active	ANALOG	5/8"		
	MW09 Rose, Matthew & Katherine	Active	57518665	5/8"		
	MW10 Toomey, William	Active	ANALOG	5/8"		
	MW100 Smith, Winthrop	Active	09027657	5/8"		
	MW101 Wyatt, Peter & Nancy	Active	07193086	5/8"		
	MW102 Alvarez, Austin & Carol	Active	07185267	5/8"	Sensus	
	MW103 Schwartz, James	Active	07048027	5/8"	Sensus	
	MW104 McCarthy, George & Nancy	Active	ANALOG	5/8"	Sensus	
	MW104A Viens, Arthur	Active	ANALOG	5/8"	Sensus	
	MW105 Roome, Ted & Cathy	Active	ANALOG	5/8"	Sensus	
	MW106 DePierro, Peter & Christine	Active	ANALOG/CUBIC	5/8"		
	MW11 Raouf, Firas	Active	52512393	5/8"		
	MW12 Vargas	Active	ANALOG	5/8"		
	MW13 Coache, Robert & Jane	Active	ANALOG	5/8"		
	MW14 Schiess, Reed	Active	35986255	5/8"	Badger	
	MW15 Strom, Judith	Active	ANALOG	5/8"		
	MW16 Berkowitz & Cote	Active	35975279	5/8"	Badger	
	MW17 Raposa & Rothenbuhler	Active	61135341	5/8"		
	MW18 Shapiro, Ken	Active	ANALOG	5/8"		
	MW19 Turcotte, Norman & Pat	Active	ANALOG	5/8"		
	MW20 Browne, Edward & Linda	Active	ANALOG	5/8"		
	MW21 Naylor, Robert & Patricia	Active	ANALOG	5/8"		
	MW22 Gray, John	Active	ANALOG	5/8"		

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+	Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
	MW23 Lussier, Wayne & Karen	Active	61135342	5/8"		
	MW24 Gaff, Doug & Brenda	Active	ANALOG	5/8"		
	MW25 Keegan, Howard	Active	57518565	5/8"		
	MW26 Minahan, Madeline	Active	ANALOG	5/8"		
	MW27 Bracken, David & Katherine	Active	ANALOG	5/8"		
	MW28 Giglio Family	Active	ANALOG	5/8"		
	MW29 Barous, Dennis	Active	ANALOG	5/8"		
	MW30 Barrett, Richard & Nancy	Active	ANALOG	5/8"		
	MW31 DeChristoforo & Denictolis	Active	63518533	5/8"		
	MW32 Brownell, Thomas	Active	ANALOG	5/8"		
	MW33 Ewing, Thomas J./DEMT LLC	Active	ANALOG	5/8"		
	MW34 Camerlin, Larry & Ruth	Active	ANALOG	5/8"		
	MW35 Horrigan, James	Active	52512395	5/8"		
	MW36 Balliro-Speer, Daveen	Active	63518478	5/8"		
	MW37 Deveau, John & Loren	Active	ANALOG	5/8"		
	MW38 Hart, Sarah	Active	57519056	5/8"		
	MW39 Gagne, Roger & Deborah	Active	ANALOG	5/8"		
	MW40 Paquette, Victor & Amy	Active	ANALOG	5/8"		
	MW41 Dow & Tarter	Active	07010688	5/8"		
	MW42 Czekanski, Antoinette	Active	57519020	5/8"		
	MW43 Souza, David & Tatyana	Active	57519019	5/8"		
	MW44 Woo, Julianne	Active	ANALOG	5/8"		
	MW45 DiGregorio, John & Beverly	Active	ANALOG	5/8"		
	MW46 Churchill, Thomas	Active	ANALOG	5/8"		
	MW47 Everett, Robert & Eleanor	Active	ANALOG	5/8"		
	MW48 Formisano, Ed & Mary Louise	Active	ANALOG	5/8"		
	MW49 Sawyer, Rick & Ellen	Active	ANALOG	5/8"		
	MW50 Kendall, Kennett	Active	ANALOG	5/8"		
	MW50A Napoli & Bilotta	Active	57519016	5/8"		
	MW51 Grabeau, Ken & Ruth	Active	ANALOG	5/8"		
	MW52 Rastiello, Connie (James)	Active	ANALOG	5/8"		
	MW53 Bryant, Richard & Joanna	Active	57518570	5/8"		
	MW54 Kaufman & Kloos	Active	57518567	5/8"		
	MW55 Davies, Peter	Active	ANALOG	5/8"	Rockwell	
	MW56 Kammann & Sweeney	Active	ANALOG	5/8"		
	MW57 Towne, Leland & Judith	Active	ANALOG	5/8"		
	MW58 Yorke, Marilyn	Active	ANALOG	5/8"		
	MW59 Costello, Walter & Donna	Active	57518566	5/8"		
	MW60 Fischer, Robert & Sherry	Active	ANALOG	5/8"		

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+	Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
	MW61 Ricci, Thomas	Active	ANALOG	5/8"		
	MW62 Warren, Zachary & Laura	Active	ANALOG	5/8"		
	MW63 Intriere, Lisa	Active	ANALOG	5/8"		
	MW64 Santosuosso, Lewis & Sharon	Active	ANALOG	5/8"		
	MW65 Griffin, Stephen & Susana	Active	ANALOG	5/8"		
	MW66 McCarthy, Paul & Janet	Active	ANALOG	5/8"		
	MW67 Presti, Richard & Audrey	Active	ANALOG	5/8"		
	MW68 Friedman, Lee & Helen	Active	ANALOG	5/8"		
	MW69 Lee, Kevin & Priscilla	Active	ANALOG	5/8"		
	MW70 Lowe, Donald	Active	ANALOG	5/8"		
	MW71 Twohig, Mike & Laurie	Active	ANALOG	5/8"		
	MW72 Tupper, Sherry	Active	ANALOG	5/8"		
	MW73 Rubin, Steven & Kerrie	Active	71003456	5/8"	Elster	
	MW74 Pothuru & Darulova	Active	71003759	5/8"	Elster	
	MW75 Knowles, Ann	Active	ANALOG	5/8"		
	MW76 Porreca, Gregory & Jamie	Active	35975336	5/8"	Badger	
	MW77 Lane, Peter & Victoria	Active	ANALOG	5/8"		
	MW78 Jacob, Daniel & Janice	Active	52512391	5/8"		
	MW79 Knowles, Jim & Jane	Active	07185266	5/8"		
	MW80 Weber, Peter & Karen	Active	ANALOG	5/8"		
	MW81 Gregory, Nicholas & Athena	Active	07774892	5/8"		
	MW81A Hornick, James	Active	07734579	5/8"		
	MW82 Thomas, Greg & Carra Elise	Active	07792996	5/8"		
	MW83 Walsh, Michael & Betty	Active	07766582	5/8"		
	MW88 Merrill & Rosenberg	Active	ANALOG	5/8"		
	MW89 Nicoll, Robert	Active	ANALOG	5/8"		
	MW90 Lyras, Gene & Tracey	Active	ANALOG	5/8"		
	MW91 Godfrey, Tom Linda	Active	ANALOG	5/8"		
	MW92 Weir, Robert & Georgann	Active	ANALOG	5/8"		
	MW93 Konsin, John P. & Barbara Ann	Active	ANALOG	5/8"		
	MW94 Grappel & Cohen	Active	ANALOG	5/8"		
	MW95 Johnston/Rann	Active	ANALOG	5/8"		
	MW96 Lyons, Richard	Active	57518674	5/8"		
	MW97 Russell, Bob & Laura	Active	57518669	5/8"		
	MW98 Knight, Michael	Active	57518672	5/8"		
Total: 105	MW99 Kavanaugh, Peter & Mary	Active	57518673	5/8"		
PRESIDENTIAL VIEW:	PV01 Goettler, Peter & Cynthia	Active	54884733	1"	Sensus	
	PV02 Neslusan, Dennis & Jane	Active	54884730	1"	Sensus	

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+	Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
	PV03 PV3, LLC	Active	54884727	1"	Sensus	
	PV04 Murphy, Peter	Active	54884734	1"	Sensus	
	PV05 Pres View HOA	Active	65331928	1"	Sensus	
	PV06 Maldon, Jonathan & Andrea	Active	62033383	1"	Sensus	
	PV07 Donaghey, John & Cathy	Active	61116193	1"	Sensus	
	PV08 Falk, Alexander & Nora	Active	58207874	1"	Sensus	
	PV09 Spearman, Patrick & Jane	Active	58207877	1"	Sensus	
	PV10 Milligan & Ward	Active	59536752	1"	Sensus	
	PV11 Muise, Jason & Cristina	Active		1"	Sensus	
	PV12 Muise, Jason & Cristina	Active	71004447	1"	Elster	
	PV13 Allen, Derek & Cecilia	Active	62266804	1"	Sensus	
	PV14 Rose, Matthew & Katherine	Active	71438123	1"	Sensus	
Total: 15	PV15 Friel, Matthew & Lesli	Active	62033376	1"	Sensus	
ROSEBROOK TOWNHOMES:	RB01 O'Hearn, Shaun	Active	08659797	5/8"	Sensus	
	RB02 Caouette, Barry & Julie	Active	ANALOG	5/8"	Badger	
	RB03 Fuller, Peter & Mary	Active	ANALOG	5/8"	Badger	
	RB04 Jones, Mike & Linda	Active	ANALOG	5/8"	Badger	
	RB05 Van Hulle & Bunanta	Active	ANALOG	5/8"	Badger	
	RB06 Eldred, Todd & Kim	Active	10810759	5/8"	Sensus	
	RB07 Jones, Mike & Linda	Active	ANALOG	5/8"	Badger	
	RB08 Jones, Mike & Linda	Active	ANALOG	5/8"	Badger	
	RB09 Hausladen, Jennifer & Derek	Active	ANALOG	5/8"	Badger	
	RB10 Patel, Anit & Rebecca	Active	ANALOG	5/8"	Badger	
	RB11 Robie, Douglas & Dana	Active	ANALOG	5/8"	Sensus	
	RB12 DeVito, Lawrence	Active	07003922	5/8"	Sensus	
	RB13 Chung, Michael & Ava	Active	10793181	5/8"	Sensus	
	RB14 Irving, Mason & Ann	Active	ANALOG	5/8"	Badger	
	RB15 Roberts, Ernie & Paula	Active	07005133	5/8"		
	RB16 Spiller, Bert & Maria	Active	07010646	5/8"	Sensus	
	RB17 Schiller & Walrath	Active	07048029	5/8"	Sensus	
	RB18 McClenathan, Michael & Todd	Active	ANALOG	5/8"	Badger	
	RB19 Benz & Stan	Active	10798768	5/8"	Sensus	
	RB20 Jones, Mike & Linda	Active	71274465	5/8"	Badger	
	RB21 Morrow, Claudia	Active	ANALOG	5/8"	Badger	
	RB22 Rosenbaum, Brett & Heather	Active	10791994	5/8"	Sensus	
	RB23 McClenathan, Todd & Michael	Active	ANALOG	5/8"	Badger	
	RB24 Morton, David	Active	ANALOG	5/8"	Badger	
	RB25 Wilson, Tom & Vikki	Active	ANALOG	5/8"	Badger	

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+		Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
		RB26 Sousa, Joseph	Active	ANALOG	5/8"	Badger	
		RB27 Sylvestre, Sara	Active	ANALOG	5/8"	Badger	
	Total: 28	RB28 Lane, Christopher & Deirdre w/Grace	Active	73296634	5/8"	Sensus	
RIVER FRONT:		RF01 Bergum, Erik & Leslie	Active	52862858	5/8"	Sensus	
Single Family Homes		RF02 Genimatas, Dale	Active	62018065	5/8"		
		RF03 Allen, Derek & Ceciilia	Active	ANALOG	5/8"	Sensus	
		RF04 Roper, James & Lynne	Active	08658755	5/8"		
		RF05 Hardaway & Peterson	Active	71103680	5/8"	Elster	
		RF06 Wolf, Margot	Active	09507351	5/8"	Sensus	
		RF07 Kraabel, Stephen & Susan	Active	07197279	5/8"	Sensus	
		RF11 McIntire, Heidi	Active	57518670	5/8"		
	Total: 9	RF12 Martin, Steven & Elizabeth	Active	52512382	5/8"	Sensus	
STICKNEY CIRCLE:		SC01 Stevenson, Todd & Janel	Active	44780878	5/8"	Badger	
		SC02 Roy, David	Active	35975230	5/8"	Badger	
		SC03 Dinneen & McGuiggan	Active	35986252	5/8"	Badger	
		SC04 Rothery, Louise	Active	36986251	5/8"	Badger	
		SC05 Smith, Jim & Barbara	Active	73296639	5/8"	Sensus	
		SC06 Sheehan, Richard & Carole	Active	35975277	5/8"	Badger	
		SC07 Sheehan, Richard & Carole	Active	35975268	5/8"	Badger	
		SC08 Bungard, Donald & Jane	Active	35986262	5/8"	Badger	
		SC09 Abramovitch, Arlene	Active	ANALOG	5/8"	Sensus	
		SC10 Bruns, Michael & Amy	Active	ANALOG	5/8"	Sensus	
		SC11 11 Stickney Circle, LLC	Active	ANALOG	5/8"	Sensus	
		SC12 Miscione, Vincent & Elizabeth	Active	ANALOG	5/8"	Sensus	
		SC13 Blanco, Ramon & Sophie	Active	02645199	5/8"	Sensus	
		SC14 Hines, David & Deborah	Active	35986246	5/8"	Badger	
		SC15 Robie, Brad	Active	ANALOG	5/8"	Sensus	
		SC16 Yamajala, Sivaram	Active	35986249	5/8"	Badger	
		SC17 Louttit, Jonathan & Marion	Active	35975215	5/8"	Badger	
		SC18 Dolan, Jim & Joan	Active	37068849	5/8"	Sensus	
		SC19 Andriolo, Joseph & Dianne	Active	35986257	5/8"	Badger	
		SC20 Gamache & Lynch	Active	37068852	5/8"	Sensus	
		SC21 Hebert, Stephen M.	Active	35986261	5/8"	Badger	
		SC22 Neville, Kevin & Lisa	Active	63518535	5/8"	Sensus	
		SC23 Owen, William & Ann Marie	Active	35789417	5/8"	Badger	
		SC24 Kelley, Michael & Dianne	Active	13099136	5/8"	Sensus	
		SC25 Balmforth, Maxon	Active	09572087	5/8"	Sensus	

Rosebrook Water Company Inc.
Customer Meter Size & Type
June 17, 2016

Association/Business+	Customer	Customer Type	Register ID:	Meter Size	Meter Type	Meter Count
	SC26 Guerin, Taylor & Carol	Active	10771404	5/8"	Sensus	
	SC27 Wright, Alan & Yoshiko	Active	10854546	5/8"	Sensus	
	SC28 Rosa, Ron & Kim	Active	35986260	5/8"	Badger	
	SC29 Coache, Robert	Active	10799097	5/8"	Sensus	
	SC30 McBunch, Bill & Jane	Active	10952311	5/8"	Sensus	
	SC31 Savini, John & Mary Kathleen	Active	35975338	5/8"	Badger	
	SC32 Chisholm, Claire	Active	35975236	5/8"	Badger	
	SC33 Juzwic, William & Mary Lou	Active	35986247	5/8"	Badger	
	SC34 Bartolini, Wilmin & Kathleen	Active	60896181	5/8"	Sensus	
	SC35 Michell, Patricia	Active	73296631	5/8"	Sensus	
	SC36 Wilson & Thompson	Active	35789415	5/8"	Badger	
	SC37 Doyle, Mary	Active	35986250	5/8"	Badger	
	SC38 Socransky, June	Active	63518476	5/8"	Sensus	
	SC39 Hartung, Kirk & Diane	Active	63518534	5/8"	Sensus	
	SC40 Stankiewicz, Jane	Active	71003716	5/8"	Elster	
	SC41 Walker, Donna	Active	35986253	5/8"	Badger	
	SC42 Raspuzzi, Christine	Active	35986243	5/8"	Badger	
	SC43 Osbahr, John & Carolyn	Active	63518477	5/8"	Sensus	
	SC44 Caterine, John & Melinda	Active	35986264	5/8"	Badger	
	SC45 Rizzolo, Anthony & Josephine	Active	35986256	5/8"	Badger	
	SC46 Costello, Matthew & Kathleen	Active	35986254	5/8"	Badger	
	SC47 Hart, Sarah	Active	35986248	5/8"	Badger	
	SC48 Yuan, Olive	Active	35986242	5/8"	Badger	
	SC BLG B WATER METER	HOA spigot	63518474	5/8"		
	SC BLG C WATER METER	HOA spigot	35975335	5/8"	Badger	
Total: 48 Cust + 3 spigots	SC BLG F WATER METER	HOA spigot	30267358	5/8"	Sensus	
STONE HILL:	SH01 Pinstein & Dassule	Active	56585496	1"	Sensus	
	SH02 Little, Brett & Cory	Active	56585495	1"	Sensus	
	SH03 Samtani & Leslie	Active	54851044	1"	Sensus	
	SH04 Smith, Tony & Chris	Active	54851043	1"	Sensus	
	SH05 Bajer Josephine	Active	54884726	1"	Sensus	
	SH06 Komari, Tony & Suzanne	Active	54884725	1"	Sensus	
	SH07 Burt, Larry & Joanna	Active	59536751	1"	Sensus	
	SH08 Oldroyd & Cronin	Active	59616023	1"	Sensus	
	SH09 Stone, Malcolm & Carol	Active	61116196	1"	Sensus	
Total: 10	SH10 Doherty, Dermot & Christine	Active	61116195	1"	Sensus	

APPENDIX B
Site Plan
Dartmouth Brook Residential Area
For
Bretton Woods Land Co., Inc.

LINE TABLE		
LINE	BEARING	LENGTH
L-1	N72°47'18"E	60.00'
L-2	N17°12'00"W	62.49'
L-3	N17°12'42"W	115.00'
L-4	S14°41'48"W	55.71'
L-5	S39°40'03"E	24.91'
L-6	S50°19'57"W	50.00'
L-7	N39°40'03"W	29.74'
L-8	N21°44'56"E	50.00'
L-9	S68°18'12"E	89.48'
L-10	S68°11'04"E	70.34'
L-11	N14°41'48"E	44.85'
L-12	N34°03'35"W	77.48'
L-13	N67°52'45"W	47.21'
L-14	S31°44'36"E	97.35'
L-15	S04°15'18"W	108.03'
L-16	N61°31'21"E	99.85'
L-17	N10°15'20"E	107.00'
L-18	S75°20'59"W	58.47'
L-19	S13°55'48"E	18.00'
L-20	N76°00'51"E	24.00'
L-21	S13°55'48"E	18.02'
L-22	N76°04'12"E	73.13'
L-23	S70°57'23"W	58.00'
L-24	S25°21'13"E	45.42'
L-25	N76°55'55"E	33.24'
L-26	S23°53'04"E	59.41'
L-27	S01°56'26"E	6.77'
L-28	S24°59'30"E	84.42'
L-29	S82°08'20"E	93.49'
L30	S53°41'49"W	52.02'
L31	S40°19'32"E	88.71'

CURVE TABLE					
CURVE	DELTA	RADIUS	LENGTH	CHORD BEARING	CHORD
C-1	18°48'39"	298.00'	97.84'	N07°48'22"W	97.40'
C-2	37°59'22"	164.85'	109.30'	S87°11'58"E	107.31'
C-3	43°14'00"	114.85'	86.66'	S89°48'04"E	84.62'
C-4	48°45'47"	75.21'	64.01'	N09°40'59"W	62.10'
C-5	90°00'00"	40.00'	62.83'	S58°55'48"E	56.57'
C-6	1°18'24"	1025.50'	23.39'	S19°41'49"E	23.39'
C-7	6°18'36"	967.50'	106.55'	S22°11'55"E	106.50'
C-8	57°08'49"	39.00'	38.90'	S53°33'55"E	37.31'
C-9	27°07'55"	175.00'	82.87'	N26°45'34"W	82.10'
C-10	57°08'49"	39.00'	38.90'	S53°33'55"E	37.31'
C-11	27°07'55"	175.00'	82.87'	N26°45'34"W	82.10'

0 100 200 400 800

SCALE IN FEET

1IN. = 200FT.

horizons Engineering PLLC
34 School Street
Littleton, NH 03561
Phone 603.444.4111 - Fax 603.444.1343

DARTMOUTH BROOK RESIDENTIAL AREA

FOR BRETTON WOODS LAND CO., LLC

210 MOUNT WASHINGTON DRIVE, BRETTON WOODS, NH 03575
TOWN OF CARROLL, MAP 210 LOT 5
COOS COUNTY, NEW HAMPSHIRE

PHASE I LIMITS

NO.	DATE	REVISION DESCRIPTION	ENG	DWG

DATE: 1-14-09	PROJECT #: 07157
SURV'D BY: SH/RL	DRAWN BY: AJN
CHECK'D BY: AJN	ARCHIVE #: H - 4644
SHEET 1 OF 1	

APPENDIX C
Well Pumping/Water Usage Records 2015/2016

ROSEBROOK WATER SYSTEM **MONTH** January **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 50 # BAGS
1	Thu	900	NO	10.74	5.28	106,000	3.37	90,100	196,100	200	-	-
2	Fri	900	NO	10.53	5.23	102,700	4.58	122,100	224,800	200	-	-
3	Sat	920	NO	10.78	4.34	85,700	2.63	70,100	155,800	190	-	-
4	Sun	915	NO	10.57	2.78	56,700	2.87	76,300	133,000	190	-	-
5	Mon	700	BS	11.24	0.79	16,600	1.9	50,400	66,000	190	-	-
6	Tue	700	BS	10.61	3.12	62,600	2.62	69,900	132,500	190	-	-
7	Wed	700	BS	11.08	3.04	60,900	0.38	10,200	71,100	190	-	-
8	Thu	700	BS	10.72	2.84	58,600	2.48	65,300	123,900	190	-	-
9	Fri	700	BS	11.07	1.05	19,900	4.06	107,900	127,800	190	-	-
10	Sat	730	BS	10.87	4.73	92,400	2.55	66,400	158,800	190	-	-
11	Sun	735	BS	10.65	4.8	93,000	2.29	61,800	154,800	190	-	-
12	Mon	700	BS	11.06	4.65	91,300	1.28	34,000	125,300	190	-	-
13	Tue	700	BS	11.42	2.58	51,500	0.7	17,900	69,400	190	4	12
14	Wed	700	BS	10.57	4.62	99,800	1.57	41,900	141,700	190	-	-
15	Thu	900	NO	10.78	2.79	57,300	2.44	64,900	122,200	190	-	-
16	Fri	700	BS	10.97	0.77	15,400	4.86	128,600	144,000	190	-	-
17	Sat	930	NO	10.58	6.33	131,500	3.29	87,200	218,700	190	-	-
18	Sun	940	NO	10.85	3.52	69,800	3.28	87,200	157,000	190	-	-
19	Mon	630	BS	10.59	7.2	146,800	0.46	12,300	159,100	190	-	-
20	Tue	700	BS	11.01	4.83	97,300	0.79	20,700	118,000	190	-	-
21	Wed	700	BS	11.35	3.06	62,000	0	-	62,000	190	-	-
22	Thu	700	BS	10.78	6.22	123,300	0	-	123,300	190	-	-
23	Fri	715	BS	11.22	3.66	72,200	2.17	57,600	129,800	190	-	-
24	Sat	700	BS	10.83	7.59	149,900	0.55	14,200	164,100	190	-	-
25	Sun	730	BS	10.74	6.19	123,500	0.97	25,600	149,100	190	-	-
26	Mon	735	BS	10.99	5.95	120,000	0	-	120,000	190	-	-
27	Tue	700	BS	11.26	3.36	63,200	0	-	63,200	190	5	12
28	Wed	630	BS	10.74	3.68	64,200	0	-	64,200	190	-	-
29	Thu	600	BS	10.58	5.57	102,000	0.85	22,500	124,500	190	-	-
30	Fri	840	NO	11.17	0	-	0	-	-	195	-	-
31	Sat	915	BS	8.4	14.56	279,900	0	-	279,900	195	-	-
											9	24
	Totals				135.13	2,675,000	52.94	1,405,100	4,080,100			24

ROSEBROOK WATER SYSTEM **MONTH** February **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 80 # BAGS
1	Sun	928	NO	10.47	7.16	143,400	0	-	143,400	190	-	-
2	Mon	700	BS	11.26	3.01	59,000	0	-	59,000	190	-	-
3	Tue	700	BS	10.6	4.34	87,600	0	-	87,600	190	-	-
4	Wed	700	BS	10.8	4.95	98,100	0	-	98,100	190	-	-
5	Thu	700	BS	11.03	4.35	86,000	0	-	86,000	190	-	-
6	Fri	700	BS	11.11	8.24	149,300	0	-	149,300	190	-	-
7	Sat	730	BS	10.78	10.4	183,800	0	-	183,800	190	-	-
8	Sun	735	BS	11.01	4.89	91,100	0	-	91,100	190	-	-
9	Mon	700	BS	11.24	2.74	54,000	1.6	41,700	95,700	190	5	12
10	Tue	700	BS	11.24	2.82	56,500	1.44	38,400	94,900	190	-	-
11	Wed	700	BS	11.37	0	-	2.45	64,100	64,100	190	-	-
12	Thu	700	BS	10.87	3.38	65,000	2.08	54,900	119,900	190	-	-
13	Fri	840	NO	11.11	4	77,200	2.24	58,900	136,100	190	-	-
14	Sat	940	NO	10.88	4.53	89,800	2.77	73,200	163,000	190	-	-
15	Sun	925	NO	10.49	5.1	102,300	3.1	82,000	184,300	190	-	-
16	Mon	631	BS	10.85	5.36	109,700	3.06	80,500	190,200	190	-	-
17	Tue	730	BS	10.73	4.49	96,100	3.21	84,700	179,800	190	-	-
18	Wed	700	BS	10.63	5.2	105,000	3.11	82,300	187,300	190	-	-
19	Thu	700	BS	10.55	3.95	81,200	3.27	86,400	167,600	190	-	-
20	Fri	700	BS	10.64	8.41	164,700	3.53	82,000	246,700	190	5	12
21	Sat	730	BS	10.95	5.34	104,100	2.61	79,800	183,900	190	-	-
22	Sun	735	BS	10.91	2.61	52,800	2.47	65,100	117,900	190	-	-
23	Mon	700	BS	11.11	3.46	69,800	2.1	55,200	125,000	190	-	-
24	Tue	700	BS	11.11	3.17	66,400	2.07	54,600	121,000	190	-	-
25	Wed	700	BS	11.19	3.56	71,000	2.27	59,800	130,800	190	-	-
26	Thu	705	BS	11.42	3.64	74,900	1.62	42,800	117,700	190	-	-
27	Fri	830	NO	10.86	3.88	80,300	3.9	102,500	182,800	190	-	-
28	Sat	930	NO	11.06	4.16	90,100	3.58	93,900	184,000	195	-	-
	Totals				127.14	2,508,200	52.48	1,382,800	3,891,000		10	24

ROSEBROOK WATER SYSTEM **MONTH** March **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL2 GAL	SODA ASH # OF 50 # BAGS
1	Sun	900	NO	10.9	2.72	56,100	2.46	64,800	120,900	195	-	-
2	Mon	700	BS	10.94	4.06	83,600	0	-	83,600	195	4	12
3	Tue	700	BS	10.65	2.79	57,200	2.64	69,600	126,800	195	-	-
4	Wed	700	BS	11.15	0.95	19,200	2.49	65,200	84,400	190	-	-
5	Thu	700	BS	10.76	2.65	53,300	2.42	63,500	116,800	190	-	-
6	Fri	700	BS	10.61	3.64	72,900	2.53	66,300	139,200	190	-	-
7	Sat	730	BS	10.93	4.97	99,100	3.09	81,000	180,100	190	-	-
8	Sun	900	BS	10.53	4.8	95,300	2.34	61,600	156,900	190	-	-
9	Mon	700	BS	11.09	3.17	65,100	0.5	13,000	78,100	190	-	-
10	Tue	825	BS	10.69	2.58	52,800	2.06	54,200	107,000	190	-	-
11	Wed	700	BS	11.27	0	-	2.33	60,900	60,900	190	-	-
12	Thu	700	BS	10.89	3.14	64,200	2.07	54,100	118,300	190	3	8
13	Fri	1015	NO	10.88	4.21	77,900	2.2	58,000	135,900	195	-	-

ROSEBROOK WATER SYSTEM **MONTH** April **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 50 # BAGS
1	Wed	700	BS	10.72	2.87	58,400	2.33	60,300	118,700	190	-	-
2	Thu	850	NO	11.1	2.53	51,500	0	-	51,500	195	-	-
3	Fri	730	BS	11.38	0.87	17,900	2.51	66,100	84,000	190	-	-
4	Sat	730	BS	10.72	3.65	84,200	2.66	69,800	134,000	190	-	-
5	Sun	8700	BS	10.88	4.06	75,800	0	-	75,800	190	-	-
6	Mon	810	BS	10.52	3.37	54,600	2.48	64,600	119,200	190	4	12
7	Tue	850	NO	11.19	0.79	13,400	2.42	63,100	76,500	195	-	-
8	Wed	730	BS	11.17	3.89	62,900	0	-	62,900	190	-	-
9	Thu	700	BS	10.91	0.5	9,000	2.38	62,300	71,300	190	-	-
10	Fri	945	NO	10.63	4.39	71,500	2.62	42,200	113,700	190	-	-
11	Sat	850	NO	11.39	0.48	7,500	1.42	63,300	70,800	190	-	-
12	Sun	930	NO	10.53	4.45	72,900	0	-	72,900	190	-	-
13	Mon	700	BS	10.68	0	-	2.2	57,400	57,400	190	-	-
14	Tue	730	BS	10.73	3.49	60,100	0	-	60,100	190	-	-
15	Wed	840	NO	10.83	1	-	2.03	52,700	52,700	195	-	-
16	Thu	700	BS	11.11	2.3	54,300	0	-	54,300	190	-	-
17	Fri	660	BS	11.33	0	-	2.29	60,300	60,300	190	-	-
18	Sat	715	BS	11.21	3.54	67,100	0	-	67,100	190	-	-
19	Sun	520	BS	10.96	3.03	53,100	2.43	63,400	116,500	190	-	-
20	Mon	705	BS	11.38	0	-	2.33	60,900	60,900	190	-	-
21	Tue	730	BS	11.03	2.97	56,200	0	-	56,200	190	-	-
22	Wed	650	BS	11.03	0	-	2.34	61,300	61,300	190	-	-
23	Thu	644	BS	10.65	0.45	9,100	2.79	72,200	81,300	190	3	10
24	Fri	739	BS	10.69	3.64	62,200	0.89	23,200	85,400	190	-	-
25	Sat	1000	NO	10.85	3.12	54,100	1.5	39,200	93,300	190	-	-
26	Sun	1000	NO	11.01	0	-	2.26	59,000	59,000	195	-	-
27	Mon	715	BS	10.69	3.16	58,700	0	-	58,700	190	-	-
28	Tue	628	BS	10.81	0	-	1.96	51,300	51,300	190	-	-
29	Wed	655	BS	10.89	0.1	1,800	2.1	55,000	56,800	190	-	-
30	Thu	740	BS	10.95	3.62	61,900	0	-	61,900	190	-	-
	Totals				62.27	1,098,200	43.94	1,147,600	2,245,800		>	22

ROSEBROOK WATER SYSTEM MONTH May YEAR 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL2 GAL	SODA ASH # OF 50 # BAGS
1	Fri	642	BS	10.79	0	-	2.27	59,000	59,000	190	-	-
2	Sat	700	BS	10.51	4.06	70,600	2.1	55,000	125,600	190	-	-
3	Sun	710	BS	11.27	3.18	59,200	0	-	59,200	190	-	-
4	Mon	700	BS	10.72	0	-	2.29	59,900	59,900	190	-	-
5	Tue	630	BS	11.4	2.74	56,500	2.24	58,100	114,600	190	-	-
6	Wed	650	BS	10.79	4.13	67,200	2.2	57,900	125,100	190	-	-
7	Thu	805	NO	11.38	2.72	56,200	0.27	7,100	63,300	195	-	-
8	Fri	700	BS	11.15	1.01	19,900	2.36	62,300	82,200	190	-	-
9	Sat	910	NO	10.75	3.41	60,800	1.93	50,500	111,300	190	-	-
10	Sun	910	NO	10.84	0	-	2.27	59,800	59,800	195	-	-
11	Mon	650	BS	10.67	3.42	63,500	0	-	63,500	190	-	-
12	Tue	620	BS	10.63	2.67	53,500	2.19	57,600	111,100	190	-	-
13	Wed	631	BS	11.39	0	-	2.37	62,500	62,500	190	-	-
14	Thu	615	BS	11.21	2.97	61,700	0	-	61,700	190	-	-
15	Fri	550	BS	10.83	2.16	44,700	2.44	63,900	108,600	190	4	11
16	Sat	630	BS	11.27	0.72	14,800	2.28	59,700	74,300	190	-	-
17	Sun	700	BS	10.95	4.16	65,300	0	-	65,300	190	-	-
18	Mon	700	BS	10.61	0	-	2.27	59,700	59,700	190	-	-
19	Tue	700	BS	10.69	3.91	62,900	0	-	62,900	190	-	-
20	Wed	650	BS	10.61	2.76	52,100	2.42	63,300	115,400	190	-	-
21	Thu	656	BS	11.25	0.71	12,300	2.39	62,500	74,800	190	-	-
22	Fri	820	NO	10.69	2.5	48,100	2.48	65,100	113,200	190	-	-
23	Sat	930	NO	10.53	3.43	69,300	2.5	65,300	134,600	190	-	-
24	Sun	945	NO	10.69	6.65	106,700	0.91	23,900	130,600	195	-	-
26	Mon	900	BS	10.89	1.33	24,900	2.2	57,300	82,200	195	-	-
26	Tue	640	BS	10.95	2.14	37,200	2.55	66,100	103,300	190	-	-
27	Wed	715	BS	10.51	3.11	61,200	2.23	58,300	119,500	190	-	-
28	Thu	700	BS	10.95	5.61	90,100	0	-	90,100	190	4	11
29	Fri	600	BS	10.56	2.86	58,400	2.53	66,400	124,800	190	-	-
30	Sat	730	BS	11.19	0	-	2.41	33,000	33,000	190	-	-
31	Sun	735	BS	10.53	4.93	76,000	2.07	84,000	160,000	190	-	-
	Totals				77.19	1,392,900	54.17	1,418,200	2,811,100		8	22

ROSEBROOK WATER SYSTEM **MONTH** June **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL2 GAL	SODA ASH # OF 60 # BAGS
1	Mon	700	BS	11.41	9.98	153,900	0	-	153,900	190	-	-
2	Tue	720	BS	11.07	3.59	66,000	1.71	44,700	110,700	190	-	-
3	Wed	900	NO	10.63	0	-	0	-	-	180	-	-
4	Thu	700	BS	9.51	8.45	144,600	0	-	144,600	190	-	-
5	Fri	700	BS	10.75	3.6	62,300	0	-	62,300	190	-	-
6	Sat	930	NO	10.06	10.19	176,700	0	-	176,700	195	-	-
7	Sun	1050	NO	11.46	3.28	56,200	0	-	56,200	190	-	-
8	Mon	700	BS	11.27	0	-	0	-	-	90	4	9
9	Tue	700	BS	9.67	6.46	121,900	0	-	121,900	190	-	-
10	Wed	630	BS	10.56	5.2	90,400	0	-	90,400	190	-	-
11	Thu	640	BS	10.88	4.26	73,400	0	-	73,400	190	-	-
12	Fri	700	BS	10.63	5.83	100,300	0	-	100,300	190	-	-
13	Sat	700	BS	10.73	6.82	127,200	0	-	127,200	190	-	-
14	Sun	630	BS	11.23	4.19	66,200	0	-	65,200	190	-	-
15	Mon	645	BS	10.77	3.47	65,700	0	-	65,700	190	-	-
16	Tue	655	BS	10.64	6.25	117,900	0	-	117,900	190	-	-
17	Wed	700	BS	11.24	3.93	64,300	0	-	64,300	190	-	-
18	Thu	745	BS	10.7	6.49	116,700	0	-	116,700	190	-	-
19	Fri	930	NO	11.1	4.61	85,600	0	-	85,600	195	-	-
20	Sat	730	BS	10.97	3.82	58,200	0	-	58,200	190	-	-
21	Sun	720	BS	10.57	7.08	137,600	0	-	137,600	190	-	-
22	Mon	700	BS	11.31	4.05	63,700	0	-	63,700	190	-	-
23	Tue	630	BS	11.26	3.65	64,400	0	-	64,400	190	-	-
24	Wed	740	BS	10.81	5.21	86,300	0	-	86,300	190	-	-
25	Thu	700	BS	10.75	2.94	52,400	0	-	52,400	190	5	12
26	Fri	645	BS	9.71	25.58	414,000	0	-	414,000	190	-	-
27	Sat	730	BS	13.41	0	-	0	-	-	195	-	-
28	Sun	730	BS	11.17	0	-	0	-	-	190	-	-
29	Mon	700	BS	9.04	11.29	182,200	0	-	182,200	190	-	-
30	Tue	630	BS	10.81	0	-	0	-	-	195	-	-
	Totals				160.24	2,747,100	1.71	44,700	2,791,800			21

ROSEBROOK WATER SYSTEM **MONTH** July **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 50 # BAGS
1	Wed	645	BS	8.96	3.28	68,500	0	-	68,500	190	-	-
2	Thu	700	BS	8.28	6.41	127,400	0	-	127,400	190	-	-
3	Fri	740	NO	8.62	8.34	154,300	0.43	-	154,300	195	-	-
4	Sat	840	NO	8.42	0	-	0	-	-	195	-	-
5	Sun	905	NO	5.44	6.6	119,700	0	-	119,700	190	-	-
6	Mon	700	BS	5.7	9.66	165,100	0	-	165,100	190	-	-
7	Tue	600	BS	9.18	0	-	0	-	-	190	-	-
8	Wed	700	BS	6	11.39	195,100	0	-	195,100	190	-	-
9	Thu	630	BS	7.24	2.44	44,900	3.45	73,200	118,100	190	-	-
10	Fri	630	BS	7.38	0.67	11,700	7.37	196,500	208,200	195	-	-
11	Sat	700	BS	9.1	4.84	83,500	2.68	71,000	154,500	190	-	-
12	Sun	725	BS	9.02	5.3	85,000	2.16	57,500	142,500	190	-	-
13	Mon	700	BS	9.98	4.51	71,600	0	-	71,600	190	-	-
14	Tue	700	BS	9.36	3.83	62,000	2.28	60,700	122,700	190	-	-
15	Wed	700	BS	9.8	0	-	2.55	68,000	68,000	190	-	-
16	Thu	640	BS	9.07	4.12	82,500	2.47	66,000	148,500	190	3	10
17	Fri	825	NO	9.35	5.19	74,400	2.19	58,500	132,900	190	-	-
18	Sat	930	NO	9.26	4.78	80,300	2.44	65,200	145,500	195	-	-
19	Sun	910	NO	9.08	5.03	85,700	2.11	56,300	142,000	190	-	-
20	Mon	700	BS	9.66	4.17	69,100	1.09	29,400	98,500	190	-	-
21	Tue	630	BS	9.35	0	-	4.84	121,400	121,400	190	-	-
22	Wed	700	BS	9.42	4.45	74,100	2.21	59,200	133,300	195	-	-
23	Thu	635	BS	9.75	4.74	76,800	2.36	63,500	140,300	195	-	-
24	Fri	700	BS	9.98	5.13	83,300	1.35	36,200	119,500	190	-	-
25	Sat	620	BS	9.46	5.28	85,400	3.21	86,000	171,400	190	-	-
26	Sun	830	BS	9.56	4.02	65,400	1.16	30,400	95,800	190	-	-
27	Mon	630	BS	9.8	3.86	62,500	2.32	62,500	125,000	190	4	12
28	Tue	645	BS	9.82	4.62	76,600	2.45	65,800	142,400	190	-	-
29	Wed	650	BS	9.65	3.9	62,900	2.69	71,900	134,800	190	-	-
30	Thu	650	BS	9.74	5.48	90,200	1.51	40,700	130,900	190	-	-
31	Fri	900	NO	9.52	5.83	94,300	1.34	35,800	130,100	195	-	-
	Totals				137.87	2,352,300	56.36	1,476,700	3,828,000		7	22

ROSEBROOK WATER SYSTEM **MONTH** August **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL2 GAL	SODA ASH # OF 50 # BAGS
1	Sat	900	NO	9.02	1.47	24,900	4.88	131,100	156,000	190	-	-
2	Sun	915	NO	9.18	4.99	81,000	2.17	58,300	139,300	195	-	-
3	Mon	700	BS	9.63	4.9	80,300	2.1	57,300	137,600	190	-	-
4	Tue	655	BS	9.77	6.27	102,300	0	-	102,300	190	-	-
5	Wed	700	BS	9.1	6.3	100,700	2.79	74,300	175,000	190	-	-
6	Thu	630	BS	9.6	3.43	56,100	2.63	70,800	126,900	190	5	12
7	Fri	700	BS	9.85	4.05	66,400	3.92	105,600	172,000	190	-	-
8	Sat	930	BS	9.53	8.66	90,000	1.43	38,300	128,300	195	-	-
9	Sun	630	BS	9.82	2.01	80,900	2.7	72,500	153,400	190	-	-
10	Mon	700	BS	9.63	4.13	66,300	2.47	66,400	132,700	190	-	-
11	Tue	700	BS	9.76	4.24	68,900	2.53	68,200	137,100	190	-	-
12	Wed	832	BS	9.89	0	-	2.41	64,800	64,800	190	-	-
13	Thu	700	BS	9.26	5.18	84,900	2.62	70,800	155,700	190	2.5	6
14	Fri	835	NO	9.94	6.3	102,500	0.04	1,000	103,500	200	-	-
15	Sat	915	NO	9.8	6.55	108,400	2.76	74,400	182,800	195	-	-
16	Sun	930	NO	9	4.34	73,500	2.73	73,600	147,100	195	-	-
17	Mon	700	BS	9.62	4.23	72,300	2.39	64,200	136,500	190	-	-
18	Tue	700	BS	9.63	4.06	69,800	2.83	75,700	145,500	190	-	-
19	Wed	630	BS	9.6	3.82	64,500	2.88	78,200	142,700	190	-	-
20	Thu	730	BS	9.47	4.3	72,600	2.66	71,300	143,900	190	-	-
21	Fri	635	BS	9.7	4.63	78,200	2.69	72,500	150,700	190	-	-
22	Sat	730	BS	9.2	5.19	87,400	2.63	70,200	157,600	190	4	12
23	Sun	730	BS	9.18	4.5	76,200	2.56	69,300	145,500	190	-	-
24	Mon	700	BS	9.76	3.54	58,400	2.48	66,900	125,300	190	-	-
25	Tue	700	BS	9.82	0.93	16,100	2.4	65,200	81,300	190	-	-
26	Wed	650	BS	9.22	4.04	68,000	2.45	67,300	135,300	190	-	-
27	Thu	700	BS	9.51	4.35	72,500	2.34	62,600	135,100	190	-	-
28	Fri	900	NO	9.71	4.96	84,400	0.51	13,700	98,100	195	-	-
29	Sat	900	NO	9.16	4.74	81,200	2.09	56,600	137,800	195	-	-
30	Sun	910	NO	9.28	2.05	34,200	2.62	67,400	101,600	195	-	-
31	Mon	700	BS	9.58	6.35	105,900	0.02	3,800	109,700	195	-	-
	Totals				134.51	2,228,800	71.73	1,932,300	4,161,100		11.5	30

ROSEBROOK WATER SYSTEM **September 2015**

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL2 GAL	SODA ASH # OF 50 # BAGS
1	Tue	700	BS	9.76	0	-	2.22	60,200	60,200	190	5	12
2	Wed	700	BS	9.18	5.42	91,800	0	-	91,800	190	-	-
3	Thu	700	BS	9.28	3.65	62,700	2.6	70,500	133,200	190	-	-
4	Fri	700	BS	9.71	4.06	69,100	2.54	68,700	137,800	190	-	-
5	Sat	730	BS	9.63	3.96	66,900	2.95	79,600	146,500	190	-	-
6	Sun	735	BS	9.06	5.16	88,700	3.04	82,000	170,700	190	-	-
7	Mon	900	NO	9.26	0	-	2.66	72,300	72,300	195	-	-
8	Tue	600	BS	9.04	4.67	80,500	1.67	45,100	125,600	190	-	-
9	Wed	700	BS	9.7	3.69	62,800	0.86	23,200	86,000	190	-	-
10	Thu	700	BS	9.76	0.7	12,200	2.31	62,400	74,600	190	3	8
11	Fri	900	NO	9.16	3.54	61,000	2.08	56,200	117,200	190	-	-
12	Sat	915	NO	9.42	5.16	86,200	0.98	26,900	112,100	195	-	-
13	Sun	910	NO	9.34	3.44	57,500	1.6	43,100	100,600	195	-	-
14	Mon	700	BS	9.77	0.02	-	2.44	65,900	65,900	190	-	-
15	Tue	720	BS	9.33	4.3	72,000	0.87	23,500	95,500	190	-	-
16	Wed	700	BS	9.36	3.93	66,700	2.02	54,700	121,400	190	-	-
17	Thu	705	BS	9.56	3.96	66,300	0	-	66,300	190	-	-
18	Fri	1054	BS	9.06	3.63	61,300	4.71	126,600	187,900	190	-	-
19	Sat	730	BS	9.71	4.03	67,900	2.49	67,600	135,500	190	-	-
20	Sun	740	BS	9.37	0	-	2.4	64,800	64,800	190	-	-
21	Mon	700	BS	9.14	5.59	95,200	2.26	61,600	156,800	190	5	12
22	Tue	700	BS	9.6	17.46	88,000	0	-	88,000	190	-	-
23	Wed	700	BS	9.48	0.05	700	4.06	109,100	109,800	190	-	-
24	Thu	700	BS	9.77	4.21	75,900	1.4	38,200	114,100	195	-	-
25	Fri	1100	NO	9.56	3.89	66,000	1.11	29,800	95,800	195	-	-
26	Sat	1020	NO	9.2	3.84	65,900	2.42	65,600	131,500	195	-	-
27	Sun	910	NO	9.21	2.22	38,400	2.44	72,200	110,600	195	-	-
28	Mon	700	BS	9.53	2.48	41,600	2.23	54,500	96,100	190	-	-
29	Tue	700	BS	9.71	4.55	78,400	0	60,000	138,400	190	-	-
30	Wed	700	BS	9.21	0	-	2.36	4,000	4,000	190	-	-
	Average				3.58	54,090	1.96	52,943	107,033			
	Totals				107.51	1,622,700	59	1,588,300	3,211,000		13	32

ROSEBROOK WATER SYSTEM **MONTH** October **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 50 # BAGS
1	Thu	700	BS	9.03	4.06	70,800	2.08	56,700	127,500	190	-	-
2	Fri	700	BS	9.71	4.4	75,600	2	53,700	129,300	190	-	-
3	Sat	750	BS	9.62	4.61	81,500	0.97	27,100	108,600	190	-	-
4	Sun	800	BS	9.08	3.57	59,800	2.57	70,000	129,800	190	-	-
5	Mon	700	BS	9.71	0	-	2.41	65,100	65,100	190	-	-
6	Tue	700	BS	9.03	4.67	78,800	2.09	56,600	135,400	190	-	-
7	Wed	700	BS	9.77	4.09	68,900	0	-	68,900	190	-	-
8	Thu	630	BS	9.31	3.34	57,700	2.26	61,000	118,700	190	-	-
9	Fri	830	NO	9.65	2.43	42,800	2.62	68,100	110,900	195	5	12
10	Sat	940	NO	9.31	4.88	83,300	2.73	73,500	156,800	190	-	-
11	Sun	915	NO	9.1	5.23	88,200	2.5	67,500	155,700	200	-	-
12	Mon	800	BS	9.42	4.65	78,900	2.12	57,100	136,000	195	-	-
13	Tue	700	BS	9.77	3.76	64,700	0	-	64,700	190	-	-
14	Wed	620	BS	9.26	3.44	58,200	2.38	64,100	122,300	190	-	-
15	Thu	700	BS	9.83	0	-	2.47	66,500	66,500	190	-	-
16	Fri	645	BS	9.27	4.58	77,100	2.14	57,800	134,900	190	-	-
17	Sat	700	BS	9.73	5.17	86,800	1.03	27,700	114,500	195	-	-
18	Sun	730	BS	9.35	4.2	71,000	1.96	52,300	123,300	190	-	-
19	Mon	700	BS	9.01	1.36	21,900	2.63	70,800	92,700	190	-	-
20	Tue	700	BS	9.33	4.24	71,300	0	-	71,300	190	-	-
21	Wed	700	BS	9.1	0.41	7,400	2.76	74,300	81,700	195	-	-
22	Thu	700	BS	9.12	4.46	74,400	2.18	58,900	133,300	190	-	-
23	Fri	830	NO	9.9	4.14	70,000	0.51	14,100	84,100	195	-	-
24	Sat	900	NO	9.43	2.15	36,900	2.81	76,400	113,300	190	-	-
25	Sun	910	NO	9.4	3.19	53,300	1.06	28,400	81,700	195	-	-
26	Mon	700	BS	9.463	3.83	64,200	1.67	46,300	109,500	190	-	-
27	Tue	700	BS	10	0.22	3,700	2.43	65,100	68,800	190	-	-
28	Wed	700	BS	9.83	4.15	68,800	0	-	68,800	190	-	-
29	Thu	700	BS	9.51	0	-	2.57	68,300	68,300	195	-	-
30	Fri	715	BS	9.73	4.49	76,700	0	-	76,700	195	-	-
31	Sat	730	BS	9.18	4.5	81,000	2.52	63,200	144,200	190	5	12
	Totals				104.21	1,773,700	55.37	1,489,600	3,263,300		10	24

ROSEBROOK WATER SYSTEM **MONTH** November **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 50 # BAGS
1	Sun	1030	BS	9.98	0.3	5,300	2.42	64,300	69,600	190	-	-
2	Mon	700	BS	9.9	4.11	72,500	0	-	72,500	190	-	-
3	Tue	600	BS	9.76	0	-	2.64	69,500	69,500	195	-	-
4	Wed	700	BS	9.36	4.03	71,000	0.97	25,600	96,600	190	-	-
5	Thu	815	NO	9.37	0	-	1.76	46,400	46,400	195	-	-
6	Fri	700	BS	9.11	4.62	87,500	2.42	63,600	151,100	195	-	-
7	Sat	910	NO	9.6	3.85	74,800	1.87	49,600	124,400	190	-	-
8	Sun	910	NO	9.63	0	-	1.2	31,900	31,900	195	-	-
9	Mon	700	BS	9.08	4.34	58,600	0	-	58,600	190	-	-
10	Tue	925	BS	9.03	0	-	2.34	62,000	62,000	195	-	-
11	Wed	700	BS	9.33	3.86	76,200	0	-	76,200	190	-	-
12	Thu	700	BS	9.41	0	-	2.5	66,100	66,100	195	-	-
13	Fri	640	BS	9.53	4.22	81,400	0	-	81,400	195	-	-
14	Sat	730	BS	9.31	3.03	57,200	2.69	71,400	128,600	195	-	-
15	Sun	730	BS	9.56	1.68	34,600	0	-	34,600	195	-	-
16	Mon	700	BS	9.2	0	-	2.45	65,100	65,100	190	-	-
17	Tue	740	BS	9.37	4.04	81,300	0	-	81,300	195	-	-
18	Wed	700	BS	9.45	0	-	2.58	68,500	68,500	195	-	-
19	Thu	700	BS	9.35	4.07	65,400	0	-	65,400	195	3	9
20	Fri	840	NO	9.31	0.13	1,200	2.6	68,700	69,900	195	-	-
21	Sat	1000	NO	9.02	4.52	93,000	2.37	62,900	155,900	195	-	-
22	Sun	910	NO	9.66	4.11	86,100	0	-	86,100	190	-	-
23	Mon	700	BS	9.65	3.55	6,200	3.03	80,000	86,200	195	-	-
24	Tue	700	BS	9.69	1.95	11,800	2.95	78,200	90,000	190	-	-
25	Wed	700	BS	9.06	5.03	42,700	2.37	62,700	105,400	190	-	-
26	Thu	705	BS	9.65	5.56	106,400	0	-	106,400	190	-	-
27	Fri	700	BS	9.03	4.66	90,900	3.18	83,900	174,800	190	-	-
28	Sat	730	BS	9.46	4.11	72,100	3.26	85,600	157,700	190	-	-
29	Sun	630	BS	9.03	5.12	31,300	2.8	73,600	104,900	190	-	-
30	Mon	700	BS	9.49	4.93	14,400	2.56	67,100	81,500	190	-	-
	Totals				85.84	1,321,900	60.96	1,346,700	2,668,600		3	9

ROSEBROOK WATER SYSTEM **MONTH** December **YEAR** 2015

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 50 # BAGS
1	Tue	730	BS	9.58	0	-	2.48	64,800	64,800	190	-	-
2	Wed	700	BS	9.5	3.87	77,200	0	-	77,200	190	-	-
3	Thu	700	BS	9.63	0	-	2.49	65,600	65,600	190	-	-
4	Fri	900	NO	9.56	5.15	102,700	0.2	5,400	108,100	195	-	-
5	Sat	1000	NO	9.1	4.1	82,900	2.58	67,800	150,700	195	-	-
6	Sun	950	NO	9.28	0	-	2.89	76,100	76,100	200	-	-
7	Mon	630	BS	9.21	4.01	73,000	0	-	73,000	190	-	-
8	Tue	700	BS	9.18	0	-	2.84	74,500	74,500	190	5	12
9	Wed	700	BS	9.01	4.52	80,300	2.36	61,800	142,100	190	-	-
10	Thu	700	BS	10.03	3.5	71,300	0	-	71,300	195	-	-
11	Fri	700	BS	10	0	-	2.69	70,500	70,500	195	-	-
12	Sat	640	BS	9.63	4.84	99,800	2.8	75,200	175,000	195	-	-
13	Sun	730	BS	9.98	4.15	80,700	0.06	400	81,100	190	-	-
14	Mon	700	BS	9.76	0	-	2.46	64,000	64,000	190	-	-
15	Tue	705	BS	9.58	3.67	74,600	0	-	74,600	195	-	-
16	Wed	730	BS	9.65	0	-	2.4	63,300	63,300	190	-	-
17	Thu	730	BS	9.69	3.81	79,900	0	-	79,900	190	-	-
18	Fri	900	NO	9.51	1.07	14,300	2.72	71,800	86,100	195	-	-
19	Sat	900	NO	9.09	9.75	183,200	2.93	77,500	260,700	190	-	-
20	Sun	925	NO	9.09	5.32	87,600	3.03	83,600	171,200	195	-	-
21	Mon	700	BS	9.26	4.98	76,100	2.06	58,500	134,600	190	-	-
22	Tue	730	BS	9.94	4.65	86,800	0	-	86,800	195	-	-
23	Wed	700	BS	9.51	3.7	67,700	3.74	90,500	158,200	190	-	-
24	Thu	700	BS	10.45	4	66,100	0.64	17,200	83,300	190	-	-
25	Fri	800	BS	9.05	8.31	164,700	3.06	80,600	245,300	190	-	-
26	Sat	930	BS	10.55	5	101,700	0	-	101,700	195	-	-
27	Sun	730	BS	10.01	4.81	95,200	4.56	120,300	215,500	190	5	12
28	Mon	630	BS	9.69	3.23	68,800	6.82	180,100	248,900	190	-	-
29	Tue	630	BS	9.56	7.5	152,800	3.75	98,800	251,600	190	-	-
30	Wed	635	BS	10.1	6.23	127,000	3.97	104,700	231,700	195	-	-
31	Thu	700	BS	10.09	7.04	139,800	4	104,900	244,700	195	-	-
	Totals				117.21	2,254,200	67.51	1,777,900	4,032,100		10	24

ROSEBROOK WATER SYSTEM **MONTH** January **YEAR** 2016

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL2 GAL	SODA ASH # OF 50 # BAGS
1	Fri	1000	NO	9.65	5.73	118,500	4.65	122,400	240,900	195	-	-
2	Sat	1000	NO	9.62	5.6	114,800	3.48	91,300	206,100	195	-	-
3	Sun	930	NO	9.69	5.49	114,900	3.39	89,000	203,900	190	-	-
4	Mon	815	NO	9.58	7.08	140,000	3.35	87,900	227,900	195	-	-
5	Tue	720	BS	9.51	6.96	138,000	3.58	94,200	232,200	195	-	-
6	Wed	700	BS	9.58	0	-	3.77	99,000	99,000	190	-	-
7	Thu	645	BS	9.74	0	-	5.2	137,300	137,300	190	-	-
8	Fri	700	BS	10.59	0	-	2.84	75,400	75,400	195	-	-
9	Sat	730	BS	9.51	0	-	7.19	190,300	190,300	195	-	-
10	Sun	730	BS	9.81	0	-	2.18	57,500	57,500	190	-	-
11	Mon	615	BS	9.6	0.07	1,000	8.53	225,600	226,600	195	5	12
12	Tue	700	BS	9.69	0	-	7.84	206,900	206,900	190	-	-
13	Wed	710	BS	10.49	0	-	2.49	65,900	65,900	190	-	-
14	Thu	700	BS	9.86	0	-	9.07	237,800	237,800	190	-	-
15	Fri	645	NO	10.31	0	-	5.27	138,200	138,200	195	-	-
16	Sat	930	NO	10.02	0	-	6.96	182,700	182,700	190	-	-
17	Sun	940	NO	9.71	0	-	6.14	160,200	160,200	190	-	-
18	Mon	700	BS	9.51	0	-	6.22	162,500	162,500	195	-	-
19	Tue	700	BS	9.94	0	-	4.4	123,000	123,000	195	-	-
20	Wed	700	BS	10.22	0	-	5.63	139,400	139,400	190	-	-
21	Thu	700	BS	10.36	0	-	2.63	68,900	68,900	190	-	-
22	Fri	725	BS	9.61	0	-	5.73	149,300	149,300	190	-	-
23	Sat	730	BS	9.54	0	-	9.04	214,800	214,800	190	-	-
24	Sun	740	BS	10.14	0	-	3.84	119,800	119,800	190	-	-
25	Mon	710	BS	9.83	0	-	4.91	127,500	127,500	190	5	12
26	Tue	530	BS	9.99	0	-	4.69	122,100	122,100	190	-	-
27	Wed	700	BS	10.37	0	-	3.02	60,500	60,500	195	-	-
28	Thu	705	BS	9.87	0	-	3.01	96,200	96,200	190	-	-
29	Fri	850	NO	10.06	0.07	1,000	5	129,900	130,900	195	-	-
30	Sat	910	NO	9.92	0	-	6.37	164,700	164,700	190	-	-
31	Sun	915	NO	9.81	0	-	4.91	127,100	127,100	195	-	-
	Average								151,468			
	Totals				31	628,200	155.33	4,067,300	4,696,600		10	24

ROSEBROOK WATER SYSTEM **MONTH** February **YEAR** 2016

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 50 # BAGS
1	Mon	710	BS	9.69	0	-	3.88	100,500	100,500	195	-	-
2	Tue	730	BS	10	0	-	3.68	95,800	95,800	190	-	-
3	Wed	650	NO	10.13	0	-	1.73	45,100	45,100	195	-	-
4	Thu	700	BS	10.01	0	-	1.9	49,400	49,400	195	-	-
5	Fri	630	BS	9.58	0	-	6.79	175,700	175,700	195	-	-
6	Sat	800	BS	10.08	0	-	6.32	163,300	163,300	190	-	-
7	Sun	740	BS	9.92	0	-	2.71	90,600	90,600	190	-	-
8	Mon	735	BS	9.53	0	-	4.91	106,400	106,400	190	-	-
9	Tue	700	BS	9.74	0	-	6.07	157,200	157,200	190	-	-
10	Wed	520	BS	9.9	0	-	1.22	45,300	45,300	190	-	-
11	Thu	700	BS	10.04	1.43	8,400	4.21	95,100	103,500	190	3	10
12	Fri	840	NO	9.74	0	-	5.04	130,300	130,300	190	-	-
13	Sat	900	NO	9.69	0	-	9.66	250,500	250,500	195	-	-
14	Sun	900	NO	9.71	0	-	7.39	190,200	190,200	195	-	-
15	Mon	700	BS	9.96	0	-	7.71	199,000	199,000	190	-	-
16	Tue	640	BS	10.05	0	-	7.21	186,600	186,600	190	-	-
17	Wed	635	BS	10.13	0	-	6.85	177,100	177,100	190	-	-
18	Thu	700	BS	10.37	0	-	6.15	158,400	158,400	190	-	-
19	Fri	700	BS	9.92	5.19	90,100	4.97	128,100	218,200	190	-	-
20	Sat	730	BS	9.71	10.69	186,900	2.58	68,700	255,600	190	-	-
21	Sun	720	BS	9.98	3	50,700	2.15	55,400	106,100	195	-	-
22	Mon	700	BS	10.29	5.39	90,700	0.62	16,000	106,700	195	-	-
23	Tue	700	BS	9.67	4.83	81,200	2.48	63,700	144,900	190	5	12
24	Wed	700	BS	9.85	3.81	64,500	2.11	67,400	131,900	190	-	-
25	Thu	700	BS	10.17	3.4	58,200	2.71	57,200	115,400	190	-	-
26	Fri	900	NO	10.06	3.21	55,200	0	-	55,200	195	-	-
27	Sat	910	NO	9.59	0	-	9.52	245,300	245,300	195	-	-
28	Sun	850	NO	9.65	0.44	7,600	6.26	135,500	143,100	190	-	-
29	Mon	700	BS	10.01	4.38	74,100	0.19	5,000	79,100	190	-	-
	Totals				45.97	769,600	126.01	3,256,800	4,026,400		8	22

ROSEBROOK WATER SYSTEM **MONTH** March **YEAR** 2016

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 80 # BAGS
1	Tue	700	BS	9.56	3.71	62,300	2.17	66,300	128,600	190	-	-
2	Wed	700	BS	10.22	0	-	2.47	64,100	64,100	195	-	-
3	Thu	700	BS	9.56	4.62	76,900	2.18	56,300	133,200	190	-	-
4	Fri	700	BS	10.14	5.29	88,600	2.54	66,000	154,600	190	-	-
5	Sat	730	BS	10.16	7.57	176,500	1.21	28,800	205,300	190	-	-
6	Sun	740	BS	9.78	3.47	24,700	2.24	60,400	85,100	190	-	-
7	Mon	700	BS	9.98	2.59	26,400	2.38	61,200	87,600	190	5	14
8	Tue	700	BS	9.85	3.02	50,100	2.17	56,100	106,200	190	-	-
9	Wed	700	BS	10.28	3.92	64,400	0	-	64,400	190	-	-
10	Thu	700	BS	10.03	0	-	2.41	62,200	62,200	190	-	-
11	Fri	810	NO	9.6	4.81	80,100	2.31	59,400	139,500	195	-	-
12	Sat	910	NO	9.66	5.44	89,100	2.5	64,300	153,400	190	-	-
13	Sun	950	NO	9.96	5.45	89,300	2.22	57,100	146,400	190	-	-
14	Mon	700	BS	10.44	4.46	73,000	0	-	73,000	195	-	-
15	Tue	700	BS	9.93	0	-	2.38	61,300	61,300	190	-	-
16	Wed	700	BS	9.62	4.48	73,000	0	-	73,000	190	-	-
17	Thu	520	BS	9.63	3.58	58,800	2.65	68,200	127,000	190	-	-
18	Fri	700	BS	10.44	0.26	4,000	2.64	65,300	69,300	190	-	-
19	Sat	730	BS	9.56	4.6	87,500	2.56	65,900	153,400	190	-	-
20	Sun	719	BS	9.63	5.58	77,400	2.25	58,100	135,500	190	-	-
21	Mon	655	BS	10.37	3.86	62,700	0	-	62,700	190	-	-
22	Tue	630	BS	10.15	0	-	2.2	56,400	56,400	190	-	-
23	Wed	700	BS	9.56	4.22	68,700	0	-	68,700	190	-	-
24	Thu	700	BS	9.67	3.77	61,300	2.41	61,800	123,100	190	5	12
25	Fri	900	NO	10.37	0.24	3,900	2.59	66,800	70,700	195	-	-
26	Sat	910	NO	9.63	5.49	89,300	2.24	57,500	146,800	195	-	-
27	Sun	930	NO	9.69	4.75	77,100	0	-	77,100	195	-	-
28	Mon	705	BS	9.66	1.45	24,100	2.27	58,700	82,800	190	-	-
29	Tue	910	NO	9.87	2.54	41,100	0	-	41,100	195	-	-
30	Wed	630	BS	9.51	0	-	2.43	62,200	62,200	190	-	-
31	Thu	630	BS	9.67	3.92	64,000	0	-	64,000	190	-	-
	Totals				103.07	1,694,300	53.32	1,384,400	3,078,700		10	26

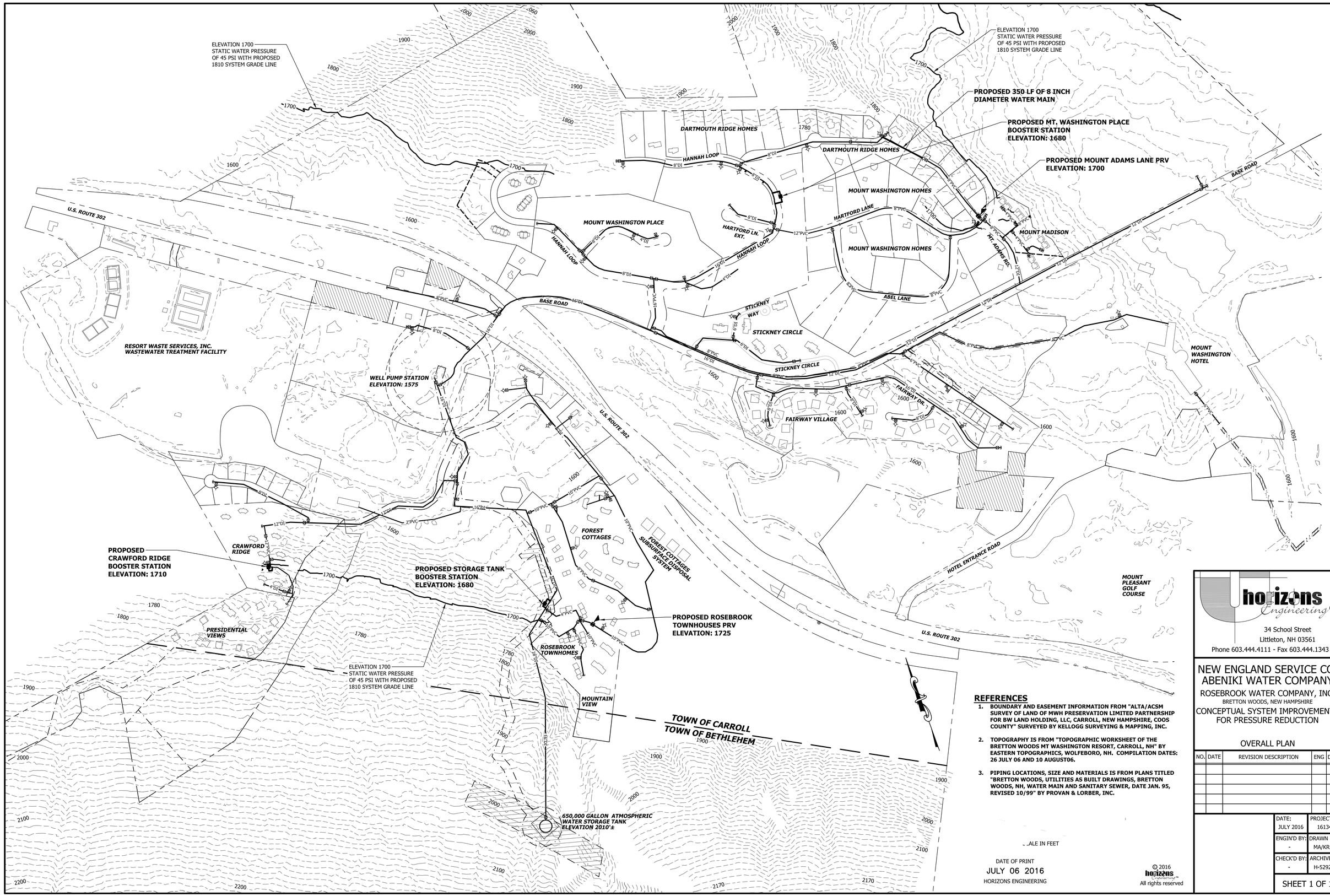
ROSEBROOK WATER SYSTEM **MONTH** April **YEAR** 2016

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL_2 GAL	SODA ASH # OF 50 # BAGS
1	Fri	700	BS	9.62	1.8	30,100	2.23	57,900	88,000	190	-	-
2	Sat	730	BS	9.96	2.31	37,500	2.22	57,000	94,500	190	-	-
3	Sun	735	BS	9.92	4.03	65,200	0	-	65,200	190	-	-
4	Mon	700	BS	10.03	0	-	2.15	55,300	66,300	190	-	-
5	Tue	700	BS	10.12	3.69	59,500	0	-	59,500	190	-	-
6	Wed	640	BS	9.99	0	-	2.02	52,400	52,400	190	-	-
7	Thu	700	BS	9.9	3.76	61,100	0	-	61,100	190	-	-
8	Fri	900	NO	9.92	0.05	700	2.29	59,300	60,000	195	-	-
9	Sat	1100	NO	9.48	3.8	61,600	2.38	60,900	122,500	195	-	-
10	Sun	900	NO	10.44	3.55	57,500	0.11	3,000	60,500	195	-	-
11	Mon	700	BS	10.45	0	-	1.02	26,100	26,100	190	-	-
12	Tue	630	BS	9.94	0	-	1.38	35,500	35,500	190	-	-
13	Wed	700	BS	9.83	0	-	2.15	55,600	55,600	190	-	-
14	Thu	700	BS	9.9	3.79	61,300	0	-	61,300	190	-	-
15	Fri	710	BS	10.17	0	-	2.28	58,600	58,600	190	-	-
16	Sat	730	BS	10.09	4.36	70,100	0	-	70,100	190	-	-
17	Sun	745	BS	9.67	0	-	3.46	89,200	89,200	190	5	14
18	Mon	900	NO	9.92	3.75	60,700	0	-	60,700	195	-	-
19	Tue	900	NO	10.01	0	-	2.15	55,200	55,200	190	-	-
20	Wed	900	NO	9.71	0	-	3.59	92,300	92,300	195	-	-
21	Thu	900	NO	10.06	0	-	3.01	77,600	77,600	195	-	-
22	Fri	930	NO	10.22	0	-	2.24	57,800	57,800	195	-	-
23	Sat	1010	NO	9.78	3.97	64,500	2.14	54,800	119,300	195	-	-
24	Sun	925	NO	10.37	3.54	56,600	0.35	9,000	65,600	195	-	-
25	Mon	900	NO	10.45	0.14	2,300	0	-	2,300	195	-	-
26	Tue	850	NO	9.58	0	-	2.26	58,200	58,200	195	-	-
27	Wed	850	NO	9.74	3.61	67,500	0	-	57,500	195	-	-
28	Thu	855	NO	9.83	0	-	2.15	54,900	54,900	190	-	-
29	Fri	900	NO	9.75	3.9	62,100	2.37	61,300	123,400	190	-	-
30	Sat	1010	NO	10.45	3.67	58,400	0.09	2,000	60,400	195	-	-
	Totals				53.72	866,700	44.04	1,133,900	2,000,600		5	14

ROSEBROOK WATER SYSTEM **MONTH** May **YEAR** 2016

	DAY	TIME	INITIALS	RESERVOIR LEVEL	PUMP # 1 HOURS	Pump #1 Gallons	PUMP # 2 HOURS	Pump #2 Gallons	Totalizer Both Pumps	STATIC PSI	CL2 GAL	SODA ASH # OF 50 # BAGS
1	Sun	1010	NO	9.91	0	-	2.27	58,400	58,400	195	-	-
2	Mon	855	NO	9.65	4.34	69,400	2.52	65,000	134,400	190	-	-
3	Tue	1050	NO	10.4	3.7	59,300	0	-	59,300	190	-	-
4	Wed	900	NO	10.47	0.11	1,600	2.22	57,100	58,700	190	-	-
5	Thu	900	NO	10.27	3.63	58,200	0	-	58,200	195	-	-
6	Fri	855	NO	10	0	-	2.19	56,500	56,500	190	-	-
7	Sat	1010	NO	9.53	3.86	62,200	1.68	43,400	105,600	190	-	12
8	Sun	1005	NO	9.99	0	-	2.36	61,300	61,300	190	-	-
9	Mon	925	NO	9.74	3.79	61,300	0	-	61,300	190	5	-
10	Tue	830	NO	9.85	0	-	2.21	57,100	57,100	190	-	-
11	Wed	900	NO	9.63	3.93	62,800	1.21	31,300	94,100	190	-	1
12	Thu	855	NO	10.03	3.85	61,300	1.1	28,400	89,700	195	-	-
13	Fri	915	NO	10.45	0	-	2.11	54,500	54,500	195	-	-
14	Sat	1005	NO	9.92	4.19	67,600	0	-	67,600	195	-	1
15	Sun	1010	NO	9.61	11.84	191,600	5.13	133,000	324,600	193	-	-
16	Mon	730	NO	10	0	-	4.61	119,100	119,100	195	-	-
17	Tue	825	NO	10.27	0	-	5.08	131,400	131,400	195	-	-
18	Wed	950	NO	10.13	0	-	3.43	89,000	89,000	195	-	-
19	Thu	950	NO	10.47	0	-	2.18	56,300	56,300	195	-	-
20	Fri	935	NO	9.98	3.84	61,600	0	-	61,600	193	-	-
21	Sat	950	NO	9.351	3.44	55,400	2.41	62,400	117,800	193	-	-
22	Sun	905	NO	10.03	0	-	2.3	59,500	59,500	193	-	13
23	Mon	900	NO	9.81	3.38	53,800	0	-	53,800	195	5	-
24	Tue	850	NO	9.81	0	-	2.18	56,300	56,300	193	-	-
25	Wed	900	AG	9.77	3.54	56,800	0	-	56,800	195	-	-
26	Thu	900	AG	9.65	0.35	5,800	2.26	59,200	65,000	195	-	-
27	Fri	915	AG	9.53	3.95	64,000	2.23	58,000	122,000	195	-	1
28	Sat	915	NO	9.67	4.73	76,600	2.21	57,500	134,100	190	-	-
29	Sun	940	NO	9.821	5.66	91,700	1.73	45,500	137,200	190	-	-
30	Mon	840	NO	10.13	3.75	61,500	1.02	26,400	87,900	190	-	-
31	Tue	830	AG	10.1	0.06	200	2.27	58,100	58,300	190	-	-
	Totals				75.94	1,222,700	58.91	1,524,700	2,747,400		10	28

APPENDIX D
Rosebrook Water Company, Inc. - Conceptual System Improvements for Pressure Reduction



REFERENCES

1. BOUNDARY AND EASEMENT INFORMATION FROM "ALTA/ACSM SURVEY OF LAND OF MWH PRESERVATION LIMITED PARTNERSHIP FOR BW LAND HOLDING, LLC, CARROLL, NEW HAMPSHIRE, COOS COUNTY" SURVEYED BY KELLOGG SURVEYING & MAPPING, INC.
2. TOPOGRAPHY IS FROM "TOPOGRAPHIC WORKSHEET OF THE BRETTON WOODS MT WASHINGTON RESORT, CARROLL, NH" BY EASTERN TOPOGRAPHICS, WOLFEBORO, NH. COMPILATION DATES: 26 JULY 06 AND 10 AUGUST06.
3. PIPING LOCATIONS, SIZE AND MATERIALS IS FROM PLANS TITLED "BRETTON WOODS, UTILITIES AS BUILT DRAWINGS, BRETTON WOODS, NH, WATER MAIN AND SANITARY SEWER, DATE JAN. 95, REVISED 10/99" BY PROVAN & LORBER, INC.

SCALE IN FEET

DATE OF PRINT
JULY 06 2016
HORIZONS ENGINEERING

horizons Engineering Inc.
34 School Street
Littleton, NH 03561
Phone 603.444.4111 - Fax 603.444.1343

NEW ENGLAND SERVICE CO.
ABENIKI WATER COMPANY
ROSEBROOK WATER COMPANY, INC.
BRETTON WOODS, NEW HAMPSHIRE

CONCEPTUAL SYSTEM IMPROVEMENTS FOR PRESSURE REDUCTION

OVERALL PLAN

NO.	DATE	REVISION DESCRIPTION	ENG	DWG

DATE: JULY 2016	PROJECT #: 16134
ENGIN'D BY: -	DRAWN BY: MA/KRP
CHECK'D BY: -	ARCHIVE #: H-5292

SHEET 1 OF 1

T:\16134 New England Service Co - Rosebrook Water\DWGS\Final\16134_WaterSystem-01.dwg, INDEX, 7/6/2016 4:45:16 PM, KRPhillbrick

APPENDIX E
Opinion of Probable Project Cost

OPINION OF PROBABLE PROJECT COST
Rosebrook Water Company
System Improvements For Pressure Reduction
Prepared by Horizons Engineering, Inc.
Jul-16

ITEM	UNITS	NO. UNITS	UNIT COST	TOTAL COST
General Conditions/Mobilization	LS	1	$5,000.00	$5,000
Well Pump Replacement				
Well #1 Vertical Turbine Pump	EA	1	$15,000.00	$15,000
Well #2 Submersible Pump	EA	1	$15,000.00	$15,000
Electrical/Controls	LS	1	$15,000.00	$15,000
Mechanical/Piping	LS	1	$5,000.00	$5,000
			Subtotal	$50,000
Storage Tank Booster Station				
Building (16 ft. x 18 ft.)	SF	288	$200.00	$57,600
Site Work/Grading	LS	1	$35,000.00	$35,000
Driveway/Access	LS	1	$20,000.00	$20,000
Electric Service	LS	1	$25,000.00	$25,000
Pumps/Mechanical	LS	1	$45,000.00	$45,000
Electrical	LS	1	$20,000.00	$20,000
Emergency Generator	LS	1	$35,000.00	$35,000
Piping/Valves	LS	1	$35,000.00	$35,000
Telemetry/Controls	LS	1	$20,000.00	$20,000
Connection to Existing	EA	2	$2,500.00	$5,000
Surface Restoration	LS	1	$7,500.00	$7,500
Erosion Control	LS	1	$1,000.00	$1,000
			Subtotal	$306,100
Crawford Ridge Booster Station				
Building (14 ft. x 16 ft.)	SF	224	$200.00	$44,800
Site Work/Grading	LS	1	$30,000.00	$30,000
Driveway/Access	LS	1	$10,000.00	$10,000
Electric Service	LS	1	$15,000.00	$15,000
Pumps/Mechanical	LS	1	$35,000.00	$35,000
Electrical	LS	1	$20,000.00	$20,000
Emergency Generator	LS	1	$35,000.00	$35,000
Piping/Valves	LS	1	$35,000.00	$35,000
Telemetry/Controls	LS	1	$15,000.00	$15,000
Connection to Existing	EA	2	$2,500.00	$5,000
Surface Restoration	LS	1	$5,000.00	$5,000
Erosion Control	LS	1	$1,000.00	$1,000
			Subtotal	$250,800
Mt. Washington Place Booster Station				
Building (14 ft. x 16 ft.)	SF	224	$200.00	$44,800
Site Work/Grading	LS	1	$20,000.00	$20,000
Driveway/Access	LS	1	$10,000.00	$10,000
Electric Service	LS	1	$15,000.00	$15,000
Pumps/Mechanical	LS	1	$35,000.00	$35,000
Electrical	LS	1	$20,000.00	$20,000
Emergency Generator	LS	1	$35,000.00	$35,000
Piping/Valves	LS	1	$35,000.00	$35,000
Telemetry/Controls	LS	1	$15,000.00	$15,000
Connection to Existing	EA	2	$2,500.00	$5,000
Surface Restoration	LS	1	$5,000.00	$5,000
Erosion Control	LS	1	$1,000.00	$1,000
			Subtotal	$240,800
Mt. Adams Lane Water Main Extension				
8 Inch Ductile Iron Water Main	LF	350	$90.00	$31,500

Ledge Removal	CY	75	$150.00	$11,250
8 Inch Gate Valves	EA	2	$2,500.00	$5,000
Connection to Existing	EA	2	$2,500.00	$5,000
Pavment Replacement	LS	1	$3,000.00	$3,000
Hydrant	EA	1	$5,000.00	$5,000
Surface Restoration	LS	1	$2,500.00	$2,500
Erosion Control	LS	1	$1,000.00	$1,000
			Subtotal	$64,250

Pressure Reducing Valves and Vaults (Rosebrook Lane, Mt. Adams Lane)

Pressure Reducing Valve Vaults	EA	2	$10,000.00	$20,000
Pressure Reducing Valves	EA	2	$7,500.00	$15,000
Gate Valves/Bypass Piping	EA	2	$15,000.00	$30,000
Connection to Existing	EA	2	$2,500.00	$5,000
Pavment Replacement	LS	1	$5,000.00	$5,000
Traffic Control	LS	1	$1,500.00	$1,500
Surface Restoration	LS	1	$1,500.00	$1,500
Erosion Control	LS	1	$500.00	$500
			Subtotal	$78,500

Subtotal Construction Cost	$995,450
15% Contingency	$149,000
Total Construction Cost	$1,144,450
Land/Easements	$30,000
Legal	$10,000
20% Engineering	$229,000
Total Project Cost	$1,413,450
ROUNDED PROJECT COST	**$1,410,000**

The State of New Hampshire
De rtment of Environmental Services
Robert R. Scott, Commissioner

February 1, 2021 via electronic mail

Senator Chuck Morse, Chairman
Drinking Water and Groundwater Trust Advisory Commission

Project: Aquarion Water Company of New Hampshire – **Mill Road Wellfield PFAS Treatment**

Subject: **Drinking Water and Groundwater Trust Fund (DWGTF) Funding Application Forms for the Special Projects Assistance Program,** dated January 22, 2021

Dear Chairman:

The New Hampshire Department of Environmental Services (NHDES) has reviewed the subject special project application for the Aquarion Water Company of New Hampshire's (Aquarion's) Mill Road Wellfield PFAS Treatment Project. Section 5.A.1 of the DWGTF Award Plan adopted May 11, 2020 (Award Plan) outlines two tasks to be completed by NHDES when an application to the Special Project Assistance Program is received: 1) screen the applications using the criteria identified in Drinking Water Loan and Grant Program DWGTF Rules for Construction Projects adopted March 11, 2019 (Construction Rules); and 2) evaluate if the project demonstrates one or more of the circumstances for special project consideration identified in the Award Plan.

The application meets the eligibility requirements of Section 5.A.1 of the award plan which requires the submittal of a certificate of the authority to submit the application and a planning document. Based on the screening and evaluation requirements of the Award Plan, NHDES is of the opinion that the project demonstrates the circumstances for the Commission's consideration as a special project out-of-cycle of the annual application review process as defined in the Award Plan and the project meets several of the screening criteria presented in the Construction Rules. Specifically, the special project application demonstrates that the project addresses contamination present within groundwater at the Mill Road Wellfield and is time critical.

The subject project is for providing treatment for per- and polyflouroalkyl substances (PFAS) present within groundwater at Aquarion Water Company's (Aquarion's) Mill Road wellfield. Aquarion is requesting a $428,250 grant from the DWGTF to supplement $1,284,750 of either internally generated funds or through the PFAS Remediation Loan Fund (PFAS RLF; to be determined).

Aquarion has conducted an extensive alternative evaluation for treatment options including PFAS bench and pilot-scale testing and has developed a preliminary granulated active carbon (GAC) water treatment plant design and opinion of probable cost for treatment of well #6. The initial cost estimate to treat well #6 and the entire wellfield was $6.3 M. Aquarion, working with their engineers Tight & Bond, completed an alternatives analysis to determine a more feasible option. The resulting project is installing GAC treatment for well #6 making use of existing facilities to reduce construction costs. The estimated cost for the proposed project is $1.71 M.

A summary of how the project demonstrates the circumstances for consideration to the Special Projects Assistance Program is provided below.

Project Addresses Contamination

Based on the subject application, PFAS concentrations have been detected in the Mill Road wellfield since 2016. Aquarion implemented a proactive strategy to minimize PFAS concentrations in the finish water being delivered to their customers through reducing operation of the contaminated wells and blending water from other wells. Although the actions taken to date have decreased PFAS levels below the MCLs, PFAS concentrations have increased in recent samples. The running annual average PFAS concentrations at the point-of-entry compliance point (blended) are currently over 80% of the MCL. On an individual well basis, well #6 has the highest concentrations of PFAS which exceed the applicable MCL for PFOA. Aquarion has a goal of adding treatment to well #6 by the summer 2021 and states in the application that if concentrations increase in the remaining Mill Road wells, blending will no longer be a viable option for maintaining concentrations below MCLs.

Application is Time Critical

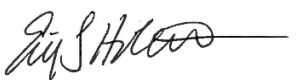
NHDES concurs with Aquarion that the application is time critical. Well #6 is needed to provide adequate supply to meet summer demands. Due to the high levels of PFOA at well #6, the Mill Road wellfield compliance sample is at risk of exceeding the MCL when #6 is operating. Aquarion has been managing the concentrations through blending and went through the process to evaluate treatment and select the most effective and feasibility option. Delays in completing the construction phase of the project may put their supply capacity and the water quality at risk.

Additional Information

NHDES notes that Aquarion is requesting a grant for 25% of the total project cost. Through discussions with the applicant, they will be seeking a 75% loan from the PFAS RLF if they are eligible.

If you have any questions, please contact me at 603-848-4259 or Erin.Holmes@des.nh.gov.

Sincerely,



Erin Holmes, P.E.
Drinking Water and Groundwater Trust Fund Administrator
MtBE Remediation Bureau

Enclosures: Drinking Water and Groundwater Trust Fund funding applications
NHDES Screening Worksheet
Route/cc: Richard Skarinka, P.E., NHDES DWGB
Michael Juranty, P.E., NHDES MtBE Remediation Bureau

NEW HAMPSHIRE DRINKING WATER &GROUNDWATER TRUST FUND

Criteria to be Considered by DWGTF Advisory Commission - Screening Worksheet

The Drinking Water and Groundwater Trust Fund (DWGTF) **Drinking Water Loan and Grant Program Rules for Construction Projects**, adopted March 11, 2019 by the DWGTF Advisory Commission, outlines *criteria that may be considered by the Commission when determining whether or not to award a loan or grant*. In accordance with the DWGTF 2019 Award Plan, the project has been screened by the New Hampshire Department of Environmental Services.

Applicant Name:	Aquarion Water Company of New Hampshire
Project Name:	Mill Road Wellfield PFAS Treatment
Application Date:	January 22, 2021

Criteria Screening Summary Table		
YES	**NO**	**NHDES Screening Notes**
1. Proposed project results in the removal, reduction or mitigation of contamination related to groundwater or drinking water.		
X		Proposed project is to install treatment for Well # 6 which exceeds current PFAS standards
2. Proof of thoroughness with respect to both the application and project development.		
X		Consultant's 2019 evaluation concluded treatment most cost effective option utilizing existing facilities with potential for expansion to treat other wells in wellfield if needed in future. Thorough vetting of alternatives with cost/benefit analysis. Wellfield consists of total of 6 wells, treatment for Well 6 will reduce potential for further contamination of wellfield.
3. Demonstrates project readiness through methods including but not limited to letters of support from local entities, preparation and submittal of preliminary engineering reports, and confirmation of approval of funds from leveraged funding sources.		
X		Conceptual evaluation report identified most cost effective treatment, design plans and specifications submitted to DES for review and bidding early spring. Letters of support from local Towns served by public water system. Authority to spend funds in-place, seeking to borrow funds from PFAS Loan program or local financing.
4. Project is consistent with the applicant's established Asset Management Program and proposed management of assets, Capital Improvement Plans, and rate analysis associated with the project.		
	X	Applicant has comprehensive asset management program. However, contamination discovered in 2016 and new standards adopted in 2020. Rate analysis performed for proposed project estimates 4% increase in water rates due to cost of treatment for PFAS.
5. Project has impact on economic development.		
X		Loss of wellfield will diminish source capacity for public water system and limit potential growth and development in service area.
6. Project is energy efficient or increases energy efficiency of the system.		
X		Renovation of existing facilities will include more efficient heating system and pumps.
7. Project improves water efficiency.		
	X	
8. Project enhances source water protection or acquisition of water sources for public consumption.		
	X	Not applicable
9. Project involves a unique or innovative approach.		
	X	
10. Project completion will result in the interconnection of two or more Public Water Systems (PWS).		
	X	
11. Project has long term viability.		
X		Treatment will provide long term use of Well 6
12. Project is for a PWS serving customers with a low Median Household Income or high Affordability index.		
	X	

NEW HAMPSHIRE DRINKING WATER &GROUNDWATER TRUST FUND

FORM 1 – FUNDING APPLICATION
for the Annual Drinking Water Construction Projects Assistance Program

RSA/Rule: RSA 485-F

The Drinking Water and Groundwater Advisory Commission is seeking funding applications requesting assistance from the Drinking Water and Groundwater Trust Fund (DWGTF) for drinking water infrastructure improvement projects.

Submission Instructions: Submission of applications online through State of NH Online Forms is strongly encouraged to reduce errors and processing time. ***Anticipated to be available online June or July 2020.***

1. Visit the State of NH Online Forms web portal at https://onlineforms.nh.gov.
2. Register for an Online Form account. If you already have an account from submitting other State of NH Online Forms you can use it for this application.
3. Click the "Finder" button in the top right. Search for "DWGTF". Select the "DWGTF Funding Application Form for the Annual Drinking Water Construction Projects Assistance Program".
4. Complete all steps and submit. You can save and return to your application before submitting.
5. After submitting, you can track the status of your application through the State of NH Online Forms web portal.

If the applicant is unable to submit an online Form, a PDF may be emailed to ***erin.holmes@des.nh.gov***.

The deadline for submission is September 10, 2020 (midnight).

For eligibility requirements, guidance in completing this application, and additional information regarding the criteria the Commission may use in making funding decisions, refer to the Advisory Commission's **"Rules for Construction Projects"** and **"2020 Award Plan"** posted on the Trust Fund website at https://www4.des.state.nh.us/nh-dwg-trust/

1. APPLICANT INFORMATION			
APPLICANT NAME: Aquarion Water Company of New Hampshire			
ORGANIZATION NAME: Aquarion Water Company of New Hampshire			
PWS # (if applicable): NH1051010	Ownership: ☐ Public (e.g. Municipal) ☒ Private (e.g. Mobile Home Park/Condo Association)		
ADDRESS: 835 Main Street			
CITY: Bridgeport		STATE: CT	ZIP: 06604
CONTACT PERSON: John Walsh		TITLE: Vice President of Operations & Utility Innovation	
PHONE: 781-413-6175	EMAIL: JWalsh@aquarionwater.com		

2. THRESHOLD REQUIREMENTS TO SUBMIT AN APPLICATION
Instructions*: In accordance with the Commission's "2020 Award Plan", the Commission requires that the funding applications include two submittals to meet the threshold for project readiness. These forms are available on the* Trust Fund website at https://www4.des.state.nh.us/nh-dwg-trust/ ***Attach these submittals to this application. Applications submitted without these attachments will be considered ineligible and will not be reviewed.***
FORM 2 – Authority to Submit a Funding Application – Not applicable
FORM 3 – Planning Document – Attachment A

3. PROJECT INFORMATION

PROJECT NAME: Mill Road Wellfield PFAS Treatment

SELECT ONE: ☐ Design/Preliminary Engineering Only ☒ Design and Construction ☐ Construction Only

PROJECT DESCRIPTION: *Provide a concise (<50 words) summary of the project. If additional space is needed, provide additional information in the Planning Document (see Section 2).*

The proposed project will provide treatment for Per and Polyflouroalkyl Substances (PFAS) present within groundwater at the Mill Road Wellfield. The wellfield consists of 6 wells in Hampton and North Hampton, NH and is critical to meet water supply needs of the Hampton, North Hampton, and Rye communities.

PRIORITY: *If you are submitting Funding Applications for multiple projects, please rank the projects in order of priority:*

1. **N/A**
2.

4. PROJECT COST/BUDGET (DRINKING WATER COSTS ONLY)

Do not include preliminary design engineering and testing costs prior to submittal of the funding application as a component of total project cost.

CATEGORY (add rows as needed)	**AMOUNT**
Construction Costs	$ 1,242,000
Construction Contingency	$ 248,000
Engineering/Planning Costs	$ 223,000
Other Costs (describe):	
TOTAL PROJECT COST	$1,713,000

Project costs are based on an opinion of probable construction cost (OPCC) included in Attachment A - Conceptual Evaluation of GAC PFAS Treatment for Well 6 dated December 2020.

5. FUNDING REQUEST (DRINKING WATER COSTS ONLY)

The sum of Other Funds Contributing to the Project + Requested Trust Fund Loan + Requested Trust Fund Grant must equal the Total Project Cost from Section 4 above.

Note: Per the Commission's rules, the Commission will endeavor to leverage the DWGTF to the greatest extent possible by taking into consideration, among other things, supplemental funds provided by the applicant. Applications for loans or grants that demonstrate that the applicant has exhausted all other possible funding sources for the proposed project may be given priority. There is no match requirement for loans; however, project proposals that provide the greatest amount of funds from sources other than DWGTF grants or loans whenever possible may be given priority.

OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$ 1,284,750	Source: Aquarion Water Company internally generated funds
OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$	Source:
OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$	Source:

REQUESTED TRUST FUND **LOAN** AMOUNT: $0 *(This must be a specific dollar amount.)*	LOAN PERCENT OF TOTAL PROJECT COST: 0% *(See Section 5 of the Commission's "2020 Award Plan".)*

REQUESTED **LOAN** TERM (select one): ☐ 5 ☐ 10 ☐ 15 ☐ 20 ☐ 25

The loan term cannot exceed the useful life of the financed improvement(s).

REQUESTED TRUST FUND **GRANT** AMOUNT: $ 428,250 *(This must be a specific dollar amount. Complete Section 6 if requesting Trust Fund grant.)*	GRANT PERCENT OF TOTAL PROJECT COST: 25% *(See Section 5 of the Commission's "2020 Award Plan".)*

Funding Plan Narrative: *If appropriate, attach a narrative explaining the Funding Plan in more detail. For example, if non-DWGTF funds have not been confirmed, explain the applicant's plan for funding the project if that outside funding is not*

approved. **All funds outside of DWGTF funds are being provided by Aquarion through internally generated funds. Aquarion Water Company will also pursue a loan of up to 75% of the project cost through the PFAS Remediation Loan Fund once the program becomes available.**

***Instructions**: If you are requesting grant funds, please complete the section below. The DWGTF Advisory Commission will review grant requests to make funding decisions.*
Note: Per the Commission's rules, projects that first request DWGTF loans whenever possible may be given priority over similar projects that request DWGTF grants. Projects that request a smaller proportion of DWGTF grant as compared to DWGTF loans whenever possible may be given priority.

Why does this project require grant funding?

The proposed project will provide treatment for per- and polyfluoroalkyl substances (PFAS) present within groundwater at the Mill Road Wellfield. PFAS are man-made chemicals that are not naturally occurring. PFAS concentrations have been detected in the wellfield since 2016. Aquarion has implemented a proactive strategy to minimize PFAS concentrations in the distribution systems through minimizing operation of the contaminated wells and blending the water from the various wells prior to delivering the water into the distribution system. However, PFAS concentrations have increased in recent samples, as described in the memo entitled "Conceptual Evaluation of GAC PFAS Treatment for Well 6". PFAS concentrations (in particular, PFOA) in the POE have exceeded the newly adopted New Hampshire Maximum Contaminant Levels (MCLs) on an individual sample basis and the running annual average is currently over 80% of the MCL. Maintaining MCL compliance will become more challenging without treatment if concentrations increase in the larger production wells. The proposed project would include granular activated carbon (GAC) treatment for Well 6, which is the well with the highest concentrations. To minimize project costs, treatment will be installed in an existing garage at the Mill Rd Wellfield to maximize the use of existing infrastructure and minimize the construction schedule. The proposed treatment would be designed with expansion for treatment of additional wells, if it becomes necessary in the future.

PFAS contamination in the Mill Road Wellfield has not been able to be traced to a single source. There are multiple PFAS contamination areas within the vicinity of the Mill Rd Wellfield and there is no clear path to identifying a responsible party who may bear the cost for treatment. Maintaining operation of the wellfield is critical to meet water supply needs of the Hampton, North Hampton, and Rye communities. Aquarion is requesting grant funding to reduce the rate impact of this project on customers in the Hampton, North Hampton, and Rye communities.

The proposed project (i.e., $1.7M construction cost) is estimated to result in about a 4% increase in water rates (based on the 2019 water rates) as calculated by Aquarion. The requested grant is $428,250 or 25% of the overall project cost. With the requested grant, it is estimated that the rate increase would be reduced to approximately 3%. Aquarion is commitment to providing the highest quality water to its customers and has already invested over $700,000 over the past four years to address PFAS contamination within the water system. Major investments have included bench scale testing, pilot-scale testing, preliminary design work, and construction of blending water mains.

Has the applicant maximized the proportion of Trust Fund loan versus Trust Fund grant requested? ☐ yes ☒ no

Instructions**: The Advisory Commission encourages applicants to seek outside funding sources and may consider the overall funding plan and percentage of outside funding sources when making funding decisions. To assist the Commission in evaluating this project, please provide the following information.* ***Enter these amounts in Section 5 above.

Have you applied to the Drinking Water State Revolving Fund (DWSRF) for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? **Aquarion Water Company is providing funding through internally generated funds.**

Have you applied to the USDA Rural Development (RD) program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? **Aquarion Water Company is providing funding through internally generated funds.**

Have you applied to Community Development Block Grant (CDBG) program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? **Aquarion Water Company is providing funding through internally generated funds.**

Have you applied to Northern Border Regional Commission program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? **Aquarion Water Company is providing funding through internally generated funds.**

Have you applied to other funding programs besides those listed above? ☐ yes ☒ no
If yes, please specify which programs, how much did you request, and what is the status? If no, why not? **Aquarion Water Company is providing funding through internally generated funds.**

Will developers, property owners, or other private entities be contributing to the project? ☐ yes ☒ no
If yes, what is the dollar amount, what is the status, and are there conditions on those contributions? If no, why not?
Aquarion Water Company is providing funding through internally generated funds. At this time, the responsible party has not been able to be identified based on multiple PFAS hot spots in the vicinity of the well field.

Is the applicant contributing its own funds to the project (cash, capital reserve, bonding from another lender, etc.)? *Do not include the DWGTF loan and grant being requested in Section 3 above.*: ☒ yes ☐ no
If yes, what is the dollar amount, what is the status, and are there conditions on those contributions? If no, why not?
Aquarion Water Company plans to fund a portion of the project (as described above) using internally generated funds..

Has the applicant exhausted all other possible funding sources for the proposed project? ☐ yes ☒ no

8. OTHER CONSIDERATIONS

***Instructions**: The Advisory Commission may consider the criteria below when determining whether or not to award a loan or grant. To assist the Commission in evaluating this project, please provide the following information.*

Will the proposed project result in the **removal, reduction, or mitigation of contamination related to groundwater or drinking water**? ☒ yes ☐ no Please explain briefly:
Aquarion has implemented a proactive strategy to minimize PFAS concentrations in the distribution systems through minimizing operation of the contaminated wells and blending the water from various wells prior to delivery into the distribution system. However, PFAS concentrations have increased in recent samples and the POE PFAS concentrations (in particular, PFOA) have exceeded the newly adopted MCLs on an individual sample basis and the running annual average is currently over 80% of the MCL. Maintaining MCL compliance will become more challenging without treatment if concentrations increase in the larger production wells. The proposed project would include granular activated carbon (GAC) treatment for Well 6, which is the well with the highest concentrations. The proposed treatment would be designed with expansion for treatment of additional wells through the addition of additional GAC filters, if it becomes necessary in the future. The PFAS concentrations in the production wells are reported in the Conceptual Evaluation of GAC PFAS Treatment for Well 6 memo in Attachment A.

Has a **preliminary engineering report** been prepared for the project? *Attach a copy if desired. The Commission may request a copy during its review*. ☒ yes ☐ no Date and name of preparer: Tighe and Bond July 2019, Tighe & Bond September 2020

Median Household Income (MHI): $ Hampton - $92,688 North Hampton - $103,649 Rye - $103,482 (ACS 2014-2018)
If known, MHI of population served (using the results of a recent income survey or latest data from the American Community Survey). Note: An income survey may be required for small, privately-owned water systems serving portions of a community where the survey data does not accurately reflect the income of the residents.

Current Annual Residential Water Rate: $ 670.57 based on $0.0093/gallon assuming 2019 water rates.
Calculate based on 71,996 gallons/year. If cost of water is included in other charges (rent, condominium fee), break out the estimated annual cost per unit of water. NHDES may request back-up documentation as these figures are used to determine affordability.

Projected Annual Residential Water Rate at Project Completion: $697.99
If you have calculated the projected water rate at project completion, please enter it here and provide an explanation of how it was calculated. If not, enter TBD.
The annual residential water rate is projected to increase by approximately 4.09% at project completion. See response to rate analysis question below.

Affordability Index: 0.70 (Projected Annual Water Rate / MHI x 100)

List **letters of support** from local entities. Attach copies if available.
Letters of support from the Towns of Hampton and North Hampton are included in Attachment B.

Is the project consistent with the applicant's **Asset Management Program**? ☐ yes ☒ no Please explain briefly:
The Mill Road PFAS Treatment Project is not included in an Asset Management Program.

Is the project consistent with the applicant's **Capital Improvement Plan**? ☐ yes ☒ no Please explain briefly:
The PFAS treatment project is not part of a Capital Improvement Plan.

Has the applicant conducted a **rate analysis** for the project? ☒ yes ☐ no Please explain briefly:
Aquarion completed a rate analysis for the proposed project. Based on the current authorized revenue and rate of return, the impact of the $1,713,000 capital cost and $60,000 annual operation and maintenance cost would result in a rate increase of 4.09%.

Briefly describe the project's impact on **economic development**.
The proposed project will create 5-10 temporary jobs during the construction of the project over a period of 3-4 months. The implementation of the treatment system will ensure safe drinking water to the communities of Hampton, North Hampton, and Rye, which will allow the communities to grow and Economic Development to occur. If the Mill Road Wellfield were to become unavailable due to PFAS contamination, water restrictions would need to be put in place which could impact economic growth within the communities.

Will the project improve **energy efficiency**? ☒ yes ☐ no Please explain briefly:
The proposed project includes adding additional insulation to the building which will house the PFAS treatment system to improve energy efficiency. Natural gas unit heaters will also be added to the building to replace existing electric unit heaters.

Has the applicant completed an **energy audit**? ☐ yes ☒ no
If so, is this project a recommendation of the audit? ☐ yes ☒ no Please explain briefly: **Aquarion has not conducted an energy audit of the project area.**

Will the project improve **water efficiency**? ☐ yes ☒ no Please explain briefly: **The project will not alter water efficiency.**

If applicable, describe how the project involves a unique and **innovative approach** and how it could be a valuable demonstration project to other water systems and/or communities.
The treatment of PFAS is relatively new within the water industry as a whole. The implementation of the treatment project will provide for the needs of Aquarion's water system but can also be used to help other water systems evaluate the capital and operating costs associated with the implementation of a treatment system for PFAS. The project also exemplifies maximizing the use of existing assets and infrastructure which reduces project costs and corresponding rate impacts. The sharing of information surrounding the alternatives considered, the associated costs, and the maximized use of assets can be used to benefit other water systems and in the end benefit those that consume water in the communities Aquarion serves and others throughout New Hampshire.

Will the project result in the **interconnection** of two or more Public Water Systems (PWS)? ☐ yes ☒ no Please explain briefly: **The proposed project involves only treatment and will not alter the connectivity of the distribution system.**

Will the project result in the elimination of a PWS through **connection to a more viable PWS**? ☐ yes ☒ no Please explain briefly: **The proposed project involves only treatment and will not alter the connectivity of the distribution system.**
How many estimated **people** will the project serve? **The project will serve 17,000 people year-round with an increase to 31,000 during the summer months.**
How many **service connections** will the project serve? **Approximately 9,000 services**

9. PROJECT SCHEDULE	
Date Authority to Borrow and/or Accept Grant Funds was received or will be received	March 2021
Anticipated Design Start Date	November 2020
Anticipated Construction Start Date	March 2021
Anticipated Project Completion Date	June 2021

10. AUTHORIZATION/CERTIFICATION	
By signing below, you are certifying that the information in this Funding Application and in any attachments are true, correct and complete to the best of the representative's knowledge and that you are authorized to submit this Funding Application. ***Also attach FORM 2 – Authority to Submit a Funding Application (see Section 2).***	
Signature of Authorized Representative:	Date: January 22, 2021 | 1:35 PM EST
Print Name: John Walsh	Title: Vice President of Operations & Utility Innovation

NEW HAMPSHIRE DRINKING WATER &GROUNDWATER TRUST FUND

DWGTF
FORM 1S – FUNDING APPLICATION
for the **Special** Projects Assistance Program

RSA/Rule: RSA 485-F

To be considered for the Special Projects Assistance Program, complete BOTH the Funding Application Form for the Annual Drinking Water Construction Projects Assistance Program AND this supplemental form. See below for submittal instructions.

For eligibility requirements, guidance in completing this application, and additional information regarding the criteria the NH Drinking Water and Groundwater Advisory Commission may use in making funding decisions, refer to the Advisory Commission's **"Rules for Construction Projects"** and **"2020 Award Plan"** posted on the Trust Fund website at https://www4.des.state.nh.us/nh-dwg-trust/

An applicant may apply to the Special Projects Assistance Program **at any time** and projects will be reviewed and evaluated on a case-by-case basis. NHDES will screen the Funding Application using the criteria identified in the Advisory Commission's **"Rules for Construction Projects"** and **"2020 Award Plan."** NHDES will also evaluate whether the project demonstrates one or more of the following circumstances as determined by the Commission for consideration outside of the annual application review:

(1) **Addresses Drinking Water Contamination**. The Commission considers addressing contamination paramount when evaluating project need.

(2) **Time Criticality**. The time critical aspect makes it impractical for the project to be considered in the annual application review. This may include, but is not limited to:
   i. Public health impacts.
   ii. Delays that would significantly impact project cost.
   iii. Project is tied to another project's schedule where completion is critical for efficiency or cost savings.

(3) **Grant Request Due to Financial Hardship**. An applicant may tailor its request to account for financial hardship. For instance, an applicant may be able to demonstrate through its median household income (MHI) and affordability index that it cannot afford to incur additional debt.

(4) **Projects that Support Economic Growth**. Special consideration may be given to projects that create or expand drinking water systems which in turn expand the economic well-being of a community. Further specific information on this type of project is provided in the Commission's "2020 Award Plan," Attachment C.

Following screening by NHDES, the Commission will decide whether or not to consider a project for the Special Projects Assistance Program and will notify the applicant of their decision and next steps, as applicable.

Submission Instructions: Submission of applications online through State of NH Online Forms is strongly encouraged to reduce errors and processing time. ***The online form is anticipated to be available July 2020.***

1. Visit the State of NH Online Forms web portal at https://onlineforms.nh.gov.
2. Register for an Online Form account. If you already have an account from submitting other State of NH Online Forms you can use it for this application.
3. Click the "Finder" button in the top right. Search for "DWGTF." Select the "DWGTF Funding Application Form for the Special Projects Assistance Program."
4. Complete all steps and submit. You can save and return to your application before submitting.
5. After submitting, you can track the status of your application through the State of NH Online Forms web portal.

If the applicant is unable to submit an online Form, a PDF may be emailed to ***erin.holmes@des.nh.gov***.

1. SPECIAL PROJECT SUPPLEMENTAL INFORMATION

CONTAMINATION. Does this project address an immediate threat to public health from contaminated drinking water?
☒ yes ☐ no Please explain briefly:

The proposed project will provide treatment for per- and polyfluoroalkyl substances (PFAS) present within groundwater at the Mill Road Wellfield. PFAS concentrations have been detected in the wellfield since 2016. Aquarion has implemented a proactive strategy to minimize PFAS concentrations in its distribution system by minimizing operation of Well 6, the well with the highest PFAS concentrations, and blending the water from various wells prior to delivery into the distribution system. However, PFAS concentrations have increased in recent samples (see Figure 1-3 Increasing PFOA Trends in Mill Road Wells in Attachment A). PFAS concentrations at Well 6 in the Mill Road Wellfield were recently found to exceed the PFOA MCL. This has resulted in the PFOA concentration in *individual samples* at the point-of-entry (POE) to exceed the MCL, and the PFOA running annual average (RAA) at the POE, which determines MCL compliance, to exceed 80% of the MCL. Refer to the Conceptual Evaluation of GAC PFAS Treatment for Well 6 memo in Attachment A for additional information about the PFAS concentrations found at Well 6.

Without PFAS treatment, maintaining MCL compliance will become more challenging if PFAS concentrations continue to increase in Well 6, and if concentrations continue to increase the larger production wells that are downgradient of Well 6 (see Figure 1-3 Increasing PFOA Trends in Mill Road Wells in Attachment A).

The proposed project would include granular activated carbon (GAC) treatment for Well 6, which is the well with the highest concentrations. To minimize project costs, treatment will be installed in an existing garage at the Mill Rd Wellfield to maximize the use of existing infrastructure and minimize the construction schedule. The proposed treatment would be designed with the ability to expand treatment to treat water from additional wells, if it becomes necessary in the future.

Attach relevant testing data.

TIME CRITICALITY. Does the time critical aspect of this project make it impractical for the project to be considered in the Commission's annual application review? ☒ yes ☐ no Please explain briefly:

Use of Well 6 in the Mill Road Wellfield is needed to provide adequate supply to meet summer demands. As mentioned in the Contamination section above, the PFOA levels at the wellfield are at risk of exceeding the MCL when Well 6 is in operation. Currently, blending of well waters is used to manage PFAS concentrations, but even with blending, some POE samples have had PFOA concentrations that exceed the MCL. Therefore, Aquarion believes it is important to install PFAS treatment for Well 6 before this upcoming summer. This will ensure that even during the high demand summer months when Well 6 is needed, we'll be able to keep PFOA concentrations in the POE below the MCL. Use of Well 6 (with PFAS treatment) will also help us protect against the migration of the PFAS to the downgradient, high producing wells (see Attachment A for details).

FINANCIAL HARDSHIP. Is this project unaffordable without a grant from the DWGTF? ☐ yes ☒ no Please explain briefly:

Provide additional information on water rates, median household income, and grant request on the DWGTF Funding Application Form for the Annual Drinking Water Construction Projects Assistance Program.

Grant funding is being requested to reduce the impact on water rates.

ECONOMIC GROWTH. Does the project create or expand drinking water systems which in turn expand the economic well-being of a community? ☐ yes ☒ no Please explain briefly:

This project will allow Aquarion to maintain its current water supply capacity. Letters of support from the impacted communities are provided in Attachment B.

2. AUTHORIZATION/CERTIFICATION

By signing below you are certifying that the information in this Funding Application and in any attachments are true, correct and complete to the best of the representative's knowledge and that you are authorized to submit this Funding Application.

Signature of Authorized Representative:	Date:January 22, 2021 | 1:31 PM EST
Print Name: John Walsh	Title: Vice President of Operations & Utility Innovation

Attachment B

Letters of Support

Town of Hampton

December 8, 2020

N.H. DWG Trust Fund
Ms. Erin Holmes, P.E.
Trust Fund Administrator

Dear Ms. Holmes,

I write in support of Aquarion Water Company's application for funding from the New Hampshire Drinking Water and Groundwater Trust Fund (DWGTF) for the Company's proposed PFAS treatment facility at its Mill Road Wellfield.

Aquarion provides drinking water to 9,500 homes and businesses in Hampton, North Hampton, and Rye. Water is provided from numerous wells, including from the Company's Mill Road Wellfield. Aquarion has detected per- and polyfluoroalkyl substances (PFAS) in the groundwater at the Mill Road Wellfield since 2016, with one well (Well #6) exhibiting higher PFAS levels than the other wells in the wellfield. To ensure continued compliance with New Hampshire's newly adopted PFAS MCLs, Aquarion is planning to construct a treatment facility in 2021 to remove PFAS from the water from Well #6. The facility would be designed so that the treatment capacity could be expanded to allow for treatment of other wells, if that becomes necessary in the future.

Funding from the DWGTF would help defray the cost of this project, and thus reduce the impact that this project would have on water rates.

I strongly support Aquarion's application and urge your consideration of providing funding from the DWGTF for this important PFAS treatment project.

Sincerely,

James B. Sullivan
Town Manager

100 Winnacunnet Road, Hampton, New Hampshire 03842 Tel. 603-926-6766 Fax 603-926-6853

MICHAEL J. TULLY
TOWN ADMINISTRATOR

mtully@northhampton-nh.gov

MUNICIPAL OFFICES
233 ATLANTIC AVENUE
NORTH HAMPTON, NH 03862

TEL: (603) 964-8087
FAX: (603) 964-1514

TOWN OF NORTH HAMPTON, NEW HAMPSHIRE
OFFICE *of the* TOWN ADMINISTRATOR

December 9, 2020

New Hampshire Department of Environmental Services
Drinking Water and Groundwater Trust Fund
29 Hazen Drive
Post Office Box 95
Concord, NH 03302-0095

Dear Administrator:

I write in support of Aquarion Water Company's application for funding from the New Hampshire Drinking Water and Groundwater Trust Fund (DWGTF) for the Company's proposed PFAS treatment facility at its Mill Road Wellfield.

Aquarion provides drinking water to 9,500 homes and businesses in Hampton, North Hampton, and Rye. Water is provided from numerous wells, including from the Company's Mill Road Wellfield. Aquarion has detected per- and polyfluoroalkyl substances (PFAS) in the groundwater at the Mill Road Wellfield since 2016, with one well (Well #6) exhibiting higher PFAS levels than the other wells in the wellfield. To ensure continued compliance with New Hampshire's newly adopted PFAS MCLs, Aquarion is planning to construct a treatment facility in 2021 to remove PFAS from the water from Well #6. The facility would be designed so that the treatment capacity could be expanded to allow for treatment of other wells if that becomes necessary in the future.

Funding from the DWGTF would help defray the cost of this project, and thus reduce the impact that this project would have on water rates.

I strongly support Aquarion's application and urge your consideration of providing funding from the DWGTF for this important PFAS treatment project.

Sincerely,

Michael J. Tully
Town Administrator

NEW HAMPSHIRE DRINKING WATER &GROUNDWATER TRUST FUND

FORM 3 – PLANNING DOCUMENT
for the Construction Projects Assistance Program

In accordance with its "2020 Award Plan," the NH Drinking Water and Groundwater Advisory Commission "Commission" requires that the funding applications for the Construction Projects Assistance Programs include submittal of a Planning Document to meet the threshold for project readiness.

Applications submitted without this attachment will be considered ineligible and will not be reviewed.

Submission Instructions: Submission of applications online through State of NH Online Forms is strongly encouraged to reduce errors and processing time. ***The online form is anticipated to be available June of July 2020.***

1. Visit the State of NH Online Forms web portal at https://onlineforms.nh.gov.
2. Register for an Online Form account. If you already have an account from submitting other State of NH Online Forms you can use it for this application.
3. Click the "Finder" button in the top right. Search for "DWGTF." Select the "DWGTF Funding Application Form for the Special Projects Assistance Program."
4. Complete all steps and submit. You can save and return to your application before submitting.
5. After submitting, you can track the status of your application through the State of NH Online Forms web portal.

If the applicant is unable to submit an online form, a PDF may be emailed to ***erin.holmes@des.nh.gov***.

Attach a separate document (Word or PDF format) that includes the following sections:

1. **Existing Conditions.** Describe the existing conditions of the facility or asset being rehabilitated or replaced as a result of the project. If the project involves new construction or extension of a water system describe the area to be served.
2. **Project Need**. Explain why the project is necessary. What benefits will the water system obtain from the project? What consequences are anticipated if the project is not implemented?
3. **Alternative Evaluation.** Briefly explain what alternatives were considered and their advantages and disadvantages.
4. **Recommended Alternative**. Identify and describe the recommended alternative that forms the basis of this funding request.
5. **Basis of Design**. Identify the flows, pressures and contaminant concentrations – as applicable – that form the basis of the design for the project. For example, are flows based on current or future demands? Fire flows?
6. **Opinion of Project Cost.** (also enter the project cost in Section 4 of the Funding Application). Include engineering, administrative, legal, land/easement acquisition, permitting, construction and contingency costs. Explain the basis of the cost estimates, for example vendor budget pricing, quotes, engineer's opinion of cost, etc.

The level of detail in the document should be consistent with the size and complexity of the proposed project. For example, rehabilitation or replacement of an existing pump house for a small system may only require a few sentences in each section whereas development of a new supply source for a large community water system may require additional detail.

The intent of this requirement is to ensure the applicant has performed a minimum amount of planning and evaluation to define the project for which funding is being requested. It is understood that designs evolve over time as new information becomes available. The planning document should reflect the information available at the time of the application.

An example Planning Document will be made available at https://www4.des.state.nh.us/nh-dwg-trust/

Erin.holmes@des.nh.gov | (603) 271-8321
https://www4.des.state.nh.us/nh-dwg-trust/

Attachment A

Conceptual Evaluation of GAC PFAS Treatment for Well 6 Memo

(December 2020)

Conceptual Evaluation of GAC PFAS Treatment for Well 6

TO: Carl McMorran, Aquarion Water Company

FROM: James Collins, Tighe and Bond

COPY: Mark Fois, Aquarion Water Company; Peter Galant, Tighe and Bond

DATE: December 21, 2020

1.1 Existing Conditions and Project Need

Aquarion's water system in North Hampton, Hampton, and Rye includes 17 wells, approximately 140 miles of water main, 5 water treatment facilities, and 4 water storage tanks. Well 6 shown in Figure 1-1 is one of six wells located in the Mill Road wellfield that supplies the system through the Mill Rd Water Treatment Plant (WTP). From 2017-2020, the Mill Road wellfield provided 48% of the company's production and Well 6 alone provided 5-10% of total production during high-demand months (June-August) and up to 10-15% of daily system production. Per and Polyfluoroalkyl Substances (PFAS) have been detected in five of the six wells at the Mill Road Wellfield. Well 6 has the highest PFAS concentrations followed by Well 11 and 9, which are located downgradient of Well 6. The water from all of the Mill Rd wells is blended prior to chemical treatment for corrosion control and disinfection at the Mill Rd WTP. New Hampshire has maximum contaminant levels for four PFAS. Regulatory compliance is based on samples collected at the point-of-entry (POE) to the distribution system after the water from all wells is blended and treated at the WTP. Well 6 currently has concentrations of PFOA that exceed the NH MCL, individual blended water samples at the POE have exceeded the PFOA MCL, and the running annual average at the POE is currently above 80% of the MCL.

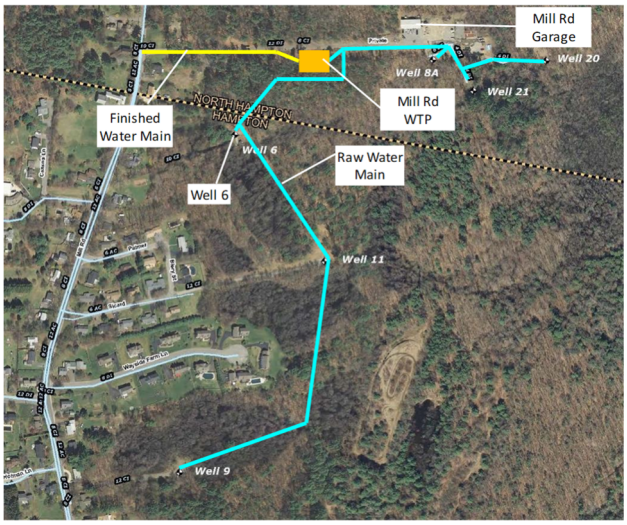


Figure 1-1: Map of the Mill Road Wellfield

Well 6 is currently the last well to turn on in the system and contains the highest PFAS concentrations, resulting in the potential for increased migration of PFAS concentrations to Wells 11 and 9, which are higher producing wells. If concentrations increase in the remaining

Mill Rd wells, blending will no longer be a viable option for maintaining PFAS concentrations below the MCLs and the system will have inadequate supply to meet demands. Treatment of Well 6 water is recommended for managing PFAS concentrations at the POE and to reduce the potential for increasing PFAS concentrations in Well 11 and 9.

PFAS in the Mill Road wellfield cannot be traced to a single source. There are several hot spots within two miles of the wellfield that could be potentials sources. Therefore, there is no clear path to identifying a responsible party who may bear the cost of treating the PFAS contamination. To determine a potential source, Aquarion would have to develop the burden of proof to identify a responsible party and pursue compensation through legal recourse, a cost potentially as high as treatment itself.

1.1.1 PFAS Concentrations

Aquarion has continued extensive production well and distribution system monitoring for PFAS concentrations.

Figures 1-2 and 1-4 through 1-6 present the NH regulated PFAS and total PFAS concentrations in the Mill Road production wells and combined entry point to the distribution system (Mill Rd WTP). Well 6 has the highest measured concentration of individual compounds as well as total concentrations. However, PFOA concentrations in Well 11 have approached the NH MCL in three of seven samples collected in 2020. PFOA is the only PFAS that has been detected above the NH MCLs in any of the Mill Road wells. Figure 1-3 shows the increasing trend in PFOA concentrations at Wells 6 and 11 from fall 2017 to summer 2020. This increasing PFOA trend may create compliance risks in a few years if left untreated. Additionally, Well 6 will be needed to meet summer 2021 demand as determined by usage history over the past years. Aquarion believes it is critical to install PFAS treatment before this upcoming summer to meet the projected summer 2021 demand.

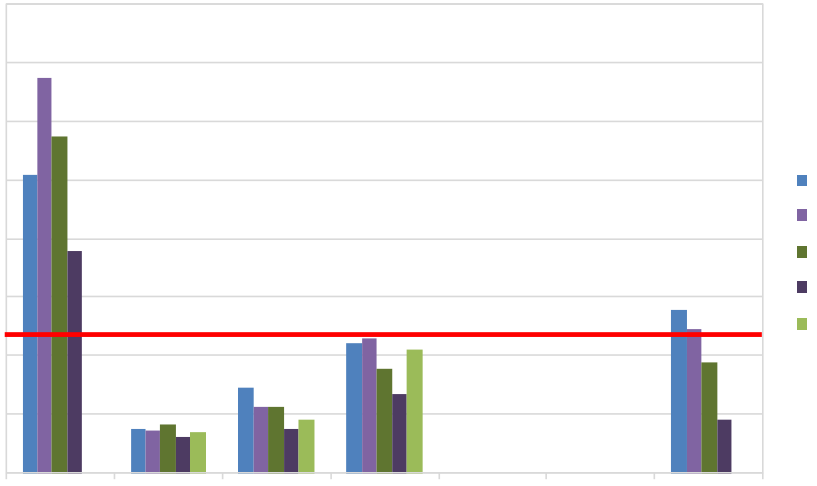


Figure 1-2: PFOA: Mill Road Wells 2020 (Note: Samples with non-detect PFAS concentrations are not included on the Figure)

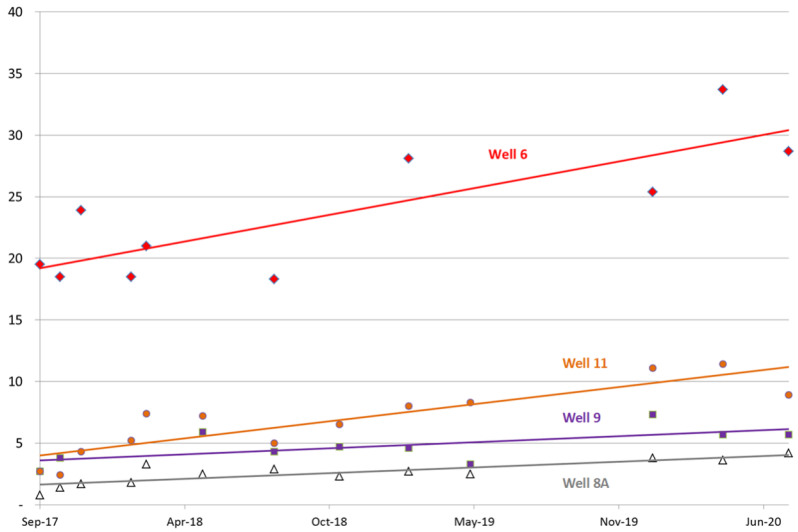


Figure 1-3: Increasing PFOA Trends in Mill Road Wells (2017 – 2020)

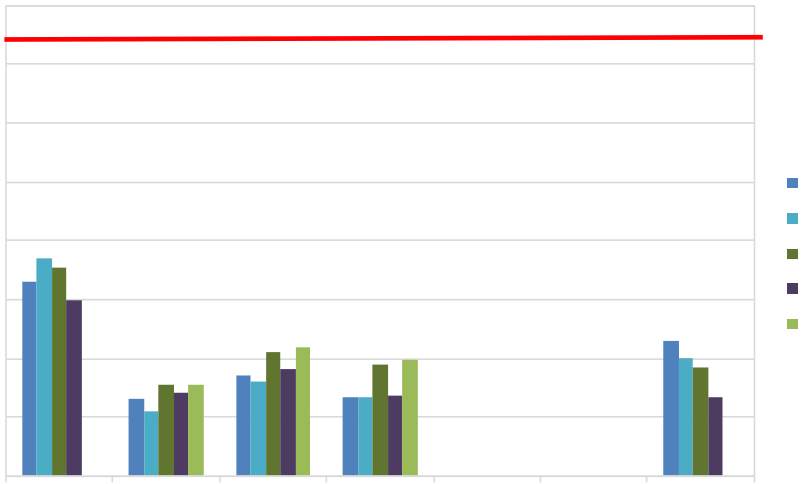


Figure 1-4: PFOS Mill Road Wells 2020 (Note: Samples with non-detect PFAS concentrations were are not included on the Figure)

Figure 1-5: PFNA Mill Road Wells 2020 (Note: Samples with non-detect PFAS concentrations are not included on the Figure)

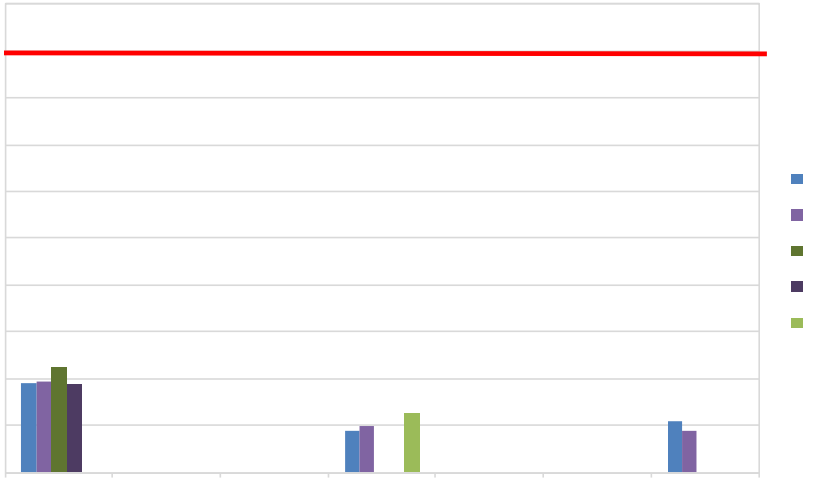


Figure 1-6: PFHxS Mill Road Wells 2020 (Note: Samples with non-detect PFAS concentrations are not included on the Figure)

1.2 Alternative Evaluation and Basis of Design

1.2.1 PFAS Treatment

Tighe & Bond prepared the *Mill Road PFAS Preliminary Treatment Analysis* (September 2019) to summarize the results of the PFAS bench and pilot scale testing, and to provide a preliminary GAC WTP design and opinion of probable construction cost for treatment of Well 6 and a rate impact analysis as a result of the proposed project. The memorandum concluded that construction of treatment for Mill Road WTP would cost approximately $3,800,000 for Phase 1 (treat Well 6 only) and $2,500,000 for Phase 2 (treatment of the whole wellfield), for a total project cost of $6,300,000.

Based on current PFAS concentrations and the risk of PFAS migration, Aquarion Water Company has a goal of treating Well 6 by the summer of 2021. To achieve this goal, construction of a new building with GAC treatment is not feasible due to the design and construction schedules. As a result, Tighe & Bond completed an alternatives analysis for treatment that can be constructed prior to June 2021.

The following memorandum summarizes a more detailed cost evaluation for four alternatives for the selected treatment alternative (granular activated carbon (GAC)), which includes purchasing GAC treatment equipment that will be housed in a metal building or utilizing the existing garage for year-round operation. This evaluation assumes additional winterization, including underground piping, tank insulation, natural gas heating, and ventilation.

1.2.2 Vessel Sizing

Three GAC vessels sizes were evaluated for treating Well 6 (Table 1-1), 8', 10', and 12' diameter vessels located in a new metal building and 8' diameter vessels located within the existing Garage located along Shop Road.

Three vessels sizes were evaluated for footprint and backwash requirements within a new building, but capital costs were only developed for two options to bracket the potential capital costs. For the 8' diameter vessels, a lead and lag vessel would be required to achieve the target Empty Bed Contact Time (EBCT) of 10 minutes. The target EBCT can be achieved with a single 10' or 12' diameter vessel. The evaluated vessels would all be able to keep building heights below 35 feet to avoid the need for a zoning variance.

Only a shorter 8' diameter vessel (7,500 lbs of carbon) was evaluated for construction within the existing garage building along Shop Road. Standard 8' diameter vessels (10,000lbs of carbon) do not fit within the available clearances within the garage. The garage has an interior clearance height of 15' at the highest point and larger 8', 10', or 12-foot vessels do not meet this height restriction. Utilization of the existing garage will eliminate the need for a new structure and the associated permitting requirements.

Parallel and lead/lag operation were evaluated for the various option. Parallel operation reduces capital costs but results in higher annual O&M costs. With parallel operation, the GAC must be monitored more closely for PFAS breakthrough with earlier media changeout than with a lead/lag operation. Lead/lag operation provides greater protection against PFAS breakthrough and additional operational flexibility for scheduling media changeout with shorter down time for changeouts.

TABLE 1-1
GAC Contactors

	8' Vessels (Garage)	8' Vessels	10' Vessels	12' Vessels
Design flow rate (gpm)	360			
Vessel operation	Parallel or Lead/Lag	Lead/Lag	Lead	Lead
Number of vessels	2 or 4	2	1	1
Vessel diameter (ft)	8	8	12	12
Media/vessel (lbs)	7,500	10,000	20,000	20,000
Total installed media (lbs)	15,000 or 30,000	20,000	20,000	20,000
Standard pressure rating (psi)	125			
Volume of media per vessel (gallons)	1,664	2,219	4,438	4,438
Design EBCT (min) per vessel	11.1	6.2	12.3	12.3
Media size (units)	12 x 40			
Bed volumes treated to media changeout[1]	75,000			
Changeout frequency at design flow rate (days)	482	321	642	642
Changeout frequency at 300 gpm flow rate (days)	578	385	770	770
GAC Vessel Purchase Price	$250,000 (pair of vessels)	$250,000 (pair of vessels)	$210,000 (lead)	$225,000 (lead)

[1] Assumed changeout based on breakthrough of regulated PFAS

[2] Assumed a building large enough for lead/lag operation

1.2.3 Backwashing

The GAC will require 20 – 30 minutes of media backwashing prior to operation after each changeout. The required backwash flow rate is approximately 8 gpm/ft^2. Table 1-2 summarizes the backwashing volumes required for each vessel size. The backwash flow rate and volume decrease with smaller diameter vessels. This analysis assumes that waste washwater will be collected in a rental frac tank and either disposed of on-site, if acceptable, or pumped out and disposed of off-site.

Table 1-2
Estimated Backwash Volumes

Vessel Size	Backwash Flow Rate (gpm)	Backwash Volume for One Vessel (gallons)
8'	400	8,000 – 12,000
10"	630	12,000 – 19,000
12'	900	18,000 – 27,000

To backwash the vessels, temporary hosing would connect to the existing hydrant located near Well 8A or Well 6 on the Well 11 and 9 raw water transmission main depending on the selected treatment location. The temporary hosing can typically be provided by the media vendor during media changeout if the hydrant is located near the treatment facility. Backwash water will be supplied by Well 8A or Wells 9 and 11. Therefore, backwashing will only be able to occur if the well(s) are in operation.

Backwash waste washwater could also be collected in conical settling tanks installed on a concrete pad outside of the metal building. The conical tanks would allow for better settling of the GAC fines for reducing the volume to be disposed of off-site, if required. Two 10,000 gallon conical settlings tanks would be required to allow sufficient storage for the backwash of both eight foot diameter vessels or one 12 foot diameter vessel. This would add an additional cost of approximately $77,000 to the OPCC of the project, including contingency.

All GAC media can release small amounts of arsenic during initial operation (typically less than 200 bed volumes) depending on site specific water quality. Calgon GAC F400AR media was assumed for this evaluation and is expected to have an initial arsenic leaching of less than 5 μg/L after initial backwash. Well 6 is approximately 10% of the total water flow for the Mill Road Water Treatment Plant. After blending, arsenic concentrations will be well below the MCL at the Mill Rd WTP Point of Entry. To further reduce potential arsenic concentrations at startup, Calgon can also provide media with additional acid washing to reduce the expected concentration to less than 2 μg/L. This media has an additional cost of $3,000 for each media changeout.

1.2.4 Building and Site Design

Two locations were evaluated for PFAS treatment 1) new building adjacent to Well 6 and 2) existing garage. Site layouts are presented in Appendix A.

1.2.4.1 New Building

The construction costs assume an insulated metal building with a concrete foundation. The building assumes one roll up door, two man doors, lights, gas unit heaters, and ventilation. The building for each vessel alternative was sized to accommodate the vessel skid (two vessels and valve rack) and 8 feet of clearance on each size. The assumed building sizes are summarized in Table 1-3. It was assumed that only one 10' or 12' vessel would be initially installed but that the building would be sized for adding a second vessel, if required in the future. For the 8' vessel it was assumed that two vessels would be installed initially and that room for future vessels would not be included.

Table 1-3
Building Size

Vessel Size	Building Size (LxWxH)
8′	38′ x 26′ x 20′
10″	42 x 27 x 27
12′	47′ x 30′ x 20′

Appendix A shows the proposed location of the new building. The building would be located in North Hampton at the corner of the Well 6 access drive and the existing clearing for the raw water mains to the Mill Road WTP.

Gas Main

The building was assumed to include gas unit heaters for year-round operation. A gas service is provided to the Mill Road Water Treatment Plant. It was assumed that there is sufficient capacity at the gas meter to service the new building. A gas main will be constructed from the gas meter at the Mill Road WTP to the proposed building along the route of the existing water main and electrical clearing.

Site Access

A truck turning analysis was completed to determine clearances for building and site access. The analysis indicated that additional clearing and gravel would be required at the entrance of the Well 6 access drive to allow trucks to enter the Well 6 access road. Trucks entering the facility would be required to turn around at the garage area of Shop Road and then enter the Well 6 access drive from the east. The additional clearing and gravel drive are shown on Sheet 1.

Piping Layout

To isolate Well 6 and allow the operation of Wells 9 and 11 while backwashing, a wye and isolation valve would be cut in before the intersection of the piping from Wells 6, 9, and 11. New 8″ HDPE piping would be installed from the wye to the proposed building. Water would be discharged into the existing 16″ water main to the north of the proposed building. A fire hydrant would be installed along the discharge line to allow for filter to waste capability for start-up.

1.2.4.2 Existing Garage

The 8′ vessels would be located within the existing garage along Shop Road. Two alternatives are presented for the 8′ Vessels, the first alternative includes one vessel pair which provides up to 6.2 min of EBCT per vessel at the design flow and 12.4 min of EBCT at the operating flow. The second alternative includes two 8′ vessel pairs, which allows the facility to operate in lead/lag operation with the same EBCTs per vessel. Note GAC usage rates will increase if the EBCT is less than 10 min. The pilot data showed breakthrough of PFOA at 60,000 bed volumes treated at 7.5 min of EBCT as compared to an anticipated PFOA breakthrough at 75,000 bed volumes treated at 10 min of EBCT.

Gas Main

This analysis assumed that the HVAC system within the existing garage will require upgrading to maintain sufficient heating and ventilation. Therefore, a gas main will be constructed from the gas meter at the Mill Road WTP to the existing garage along Shop Road.

Piping Layout

To treat the Well 6 water at the garage location, a wye and isolation valve would be cut in before the intersection of the piping from Wells 6, 9, and 11. Approximately 670 feet of 8" HDPE piping would be installed from the wye along the Well 6 access drive and along Shop Road past the Mill Road WTP. The 8" water main would transition to 16" HDPE water main after the Mill Road Water Treatment Plant and 375' of 16" HDPE piping would be installed to the existing garage location.

Building Upgrades

To house the GAC vessels within the existing garage, the garage would require several upgrades. The existing building roofing system is leaking in two locations. Therefore, the roof would require replacement to provide a watertight structure to house the new treatment equipment. In addition, the building insulation system does not meet the current building code. The insulation would be upgraded including installing insulated garage doors to minimize heat loss from the building. The building lighting system would require upgrading to provide sufficient lights in the location of the proposed GAC vessels. An upgrade to the lighting system will require the addition of backup lights and exit lighting.

1.2.5 Permitting

The following permitting is expected for the construction of PFAS treatment. The selected boiling location will impact local town permitting.

- New Building
  - North Hampton Permitting
    - Special Exception for a public utility building from the ZBA
    - Site Plan Review
  - NHDES design review

- Existing Garage
  - NHDES design review

1.3 Opinion of Probable Construction Cost

The conceptual opinion of probable construction cost (OPCC) for the PFAS treatment systems is based on Class 3 level construction cost estimates, as defined by the Association for the Advancement of Cost Engineering (AACE) International Recommended Practices and Standards. The expected accuracy range of a Class 3 estimate is between -20% to +30%. The conceptual OPCC is based on equipment costs obtained from Calgon Carbon and ECT2. Cost estimates for the new building were based on 8' and 12' GAC vessels to bracket potential capital costs. The presented costs are based on the following assumptions:

- Installation of one 12' vessel and valve rack or two 8' vessels with valve rack.
- Waste washwater will be collected in a rental frac tank and discharged locally with fines vacuumed out for disposal.

- PFAS treatment will be located in an insulated metal building with gas unit heaters, one roll up door and two man doors for 8', 10' or 12' vessels.
- PFAS treatment will be located in the existing garage for 8' vessels.
- GAC vessels will have spray-on insulation to minimize sweating in the summer.
- Well pump upgrades are not included
- Cost multipliers:
    - General conditions: 15%
    - Contingency: 20%
    - Design and construction phase engineering: 15%
- Annual O&M costs
    - Replacement frequency based on pilot test data for NH regulated PFAS
    - Labor for media changeout and additional power due to added head loss was excluded from the annual O&M costs
    - Frac tank will be onsite for 30 days

Table 1-4 summarizes the opinion of probable construction costs for all four alternatives. Cost details are provided in Appendix B. Costs assume flow meters and pressure differential sensors will be included on each vessel with communication back to the PLC at the existing Mill Rd WTP.

Table 1-4

Opinion of Probable Construction Cost and O&M Costs

	GAC			
	Existing Garage		New Building	
	8' Vessels (One Pair)	8' Vessels (Two Pairs)	8' Vessels	12' Vessels
Site Work	$227,050	$227,050	$124,644	$124,644
Building	$193,300	$193,300	$160,437	$215,073
Process Equipment	$371,750	$659,250	$295,000	$297,500
Construction Subtotal	**$792,101**	**$1,079,600**	**$580,081**	**$637,217**
General Conditions - 15%	$118,815	$161,940	$87,012	$95,583
Contingency - 20 %	$132,183	$248,310	$133,419	$146,560
Engineering - 15%	$156,465	$223,480	$120,077	$131,904
Total Project Cost	**$1,200,000**	**$1,713,000**	**$920,588**	**$1,011,264**
Annual O&M Costs for Media Changeout and Backwashing				
Backwash Tank Rental	$2,000	$2,000	$1,000	$1,000
Media Replacement	$35,250	$35,250	$22,279	$22,279
Water Quality Sampling	$21,000	$21,000	$21,000	$21,000
Natural Gas	$2,000	$2,000	$2,000	$2,000
Backwash	$2,000	$2,000	$2,000	$2,000
Total O&M Cost	**$60,250**	**$60,250**	**$46,279**	**$46,279**

1.4 Recommended Alternative

Well 6 is one of six wells located in the Mill Road wellfield that supplies the system through the Mill Rd WTP. Well 6 currently has concentrations of PFOA that exceed the NH MCL, individual blended water samples at the POE have exceeded the PFOA MCL, and the running annual average is currently above 80% of the MCL. Treatment of Well 6 water is required for managing PFAS concentrations at the POE and to reduce the potential for increasing PFAS concentration in Well 9 and 11.

Based on previous bench and pilot-scale testing, GAC is the most effective treatment alternative. Based on an evaluation of options for treating Well 6, installing GAC treatment in the existing garage is the recommended approach to meet the goal of having treatment online by June 2021. In addition, construction within the existing garage allows for future expansion to treat the additional wells, if required in the future. It is recommended to install two pair of GAC vessels for lead/lag operation to provide additional protection again PFAS breakthrough, additional operational flexibility for scheduling media changeouts, and maximizing the GAC usage by allowing greater PFAS breakthrough prior to changeout.

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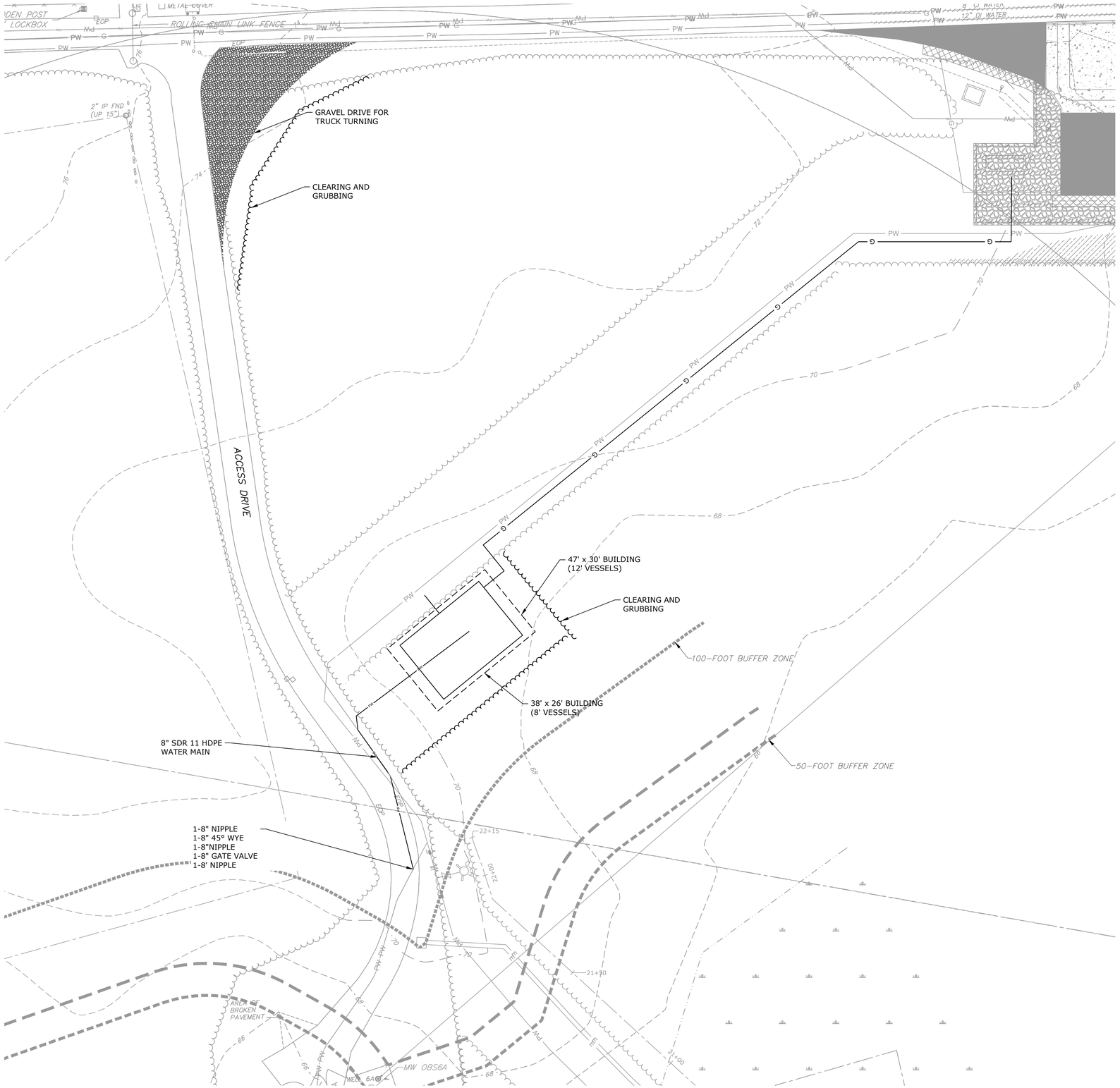
Appendix A

Conceptual Layout



N

Tighe&Bond
Engineers | Environmental Specialists

NOT FOR CONSTRUCTION

Aquarion Water Company of New Hampshire

MILL ROAD WTP PFAS TEMPORARY TREATMENT

North Hampton, New Hampshire

MARK	DATE	DESCRIPTION

PROJECT NO:	A1000/83A
DATE:	SEPTEMBER 2020
FILE:	Hampton Temporary PFAS Building.dwg
DRAWN BY:	HRB
CHECKED:	JRC
APPROVED:	PJG

SITE PLAN

SCALE: AS SHOWN

SHEET 1

Last Saved: 9/3/2020
Plotted: Thursday, September 03, 2020 9:15am By: HRB
Tighe & Bond: J:\A\A1000 AWC\83A - Mill Road PFC Treatment\Drawings_Figures\AutoCAD\Sheets\2020 PFAS\Hampton Temporary PFAS Building.dwg

N

8" SDR 11 HDPE
RAW WATER MAIN

45° BEND

1-8" FOSTER ADAPTER
1-8" GATE VALVE, MJ
1-NIPPLE, AS REQUIRED
1-8" X 16" REDUCER, MJ
1-NIPPLE, AS REQUIRED
1-16" TEE, MJ
1-NIPPLE, AS REQIRED
1-16" GATE VALVE
1-16" FOSTER ADAPTER

1-12" FOSTER ADAPTER
1-45° BEND, MJ
1-12" NIPPLE
1-45° BEND, MJ
1-FOSTER ADAPTER

1-16" FOSTER ADAPTER
1-45° BEND, MJ
1-16" NIPPLE
1-45° BEND, MJ
1-FOSTER ADAPTER

EXISTING
GARAGE
BUILDING

1-16" FOSTER ADAPTER
1-16" GATE VALVE, MJ

16" SDR 11 HDPE
TREATED WATER MAIN

8" SDR 11 HDPE
RAW WATER MAIN

1-NIPPLE, LENGTH AS REQUIRED
1-16" GATE VALVE, MJ
1-16" CAP

2" GAS MAIN

WELL 8

LIMIT OF CLEARING
AND GRUBBING

1-16" FOSTER ADAPTER
1-16" GATE VALVE, MJ
1-NIPPLE, LENGTH AS REQUIRED
1-16" TEE, MJ
1-NIPPLE, LENGTH AS REQUIRED
1-16" X 8" REDUCER, MJ
1-NIPPLE, LENGTH AS REQIRED
1-8" GATE VALVE, MJ
1-8" FOSTER ADAPTER

CUT INTO EXISTING 10" CI WATER MAIN
AND INSTALL:
1-NIPPLE, LENGTH AS REQUIRED
1-16" TEE, MJ
1-NIPPLE, LENGTH AS REQUIRED
2-16" X 10" REDUCER
2-10" GATE VALVE, MJ
2-10" FOSTER ADAPTER

CUT INTO EXISTING WELL 8 WATER
MAIN AND INSTALL:
1-8" FOSTER ADAPTER
1-45° BEND
1-NIPPLE, LENGTH AS REQUIRED
1-45° BEND
1-NIPPLE, LENGTH AS REQUIRED
1-8" FOSTER ADAPTER

8" SDR 11 HDPE
RAW WATER MAIN

45° BEND

1-8" NIPPLE, LENGTH AS REQUIRED
1-8" GATE VALVE, MJ
1-8" NIPPLE, AS REQUIRED
1-FOSTER ADAPTER

CUT INTO EXISTING MAIN AND INSTALL:
1-8" FOSTER ADAPTER
1-45° WYE, MJ
1-NIPPLE, LENGTH AS REQUIRED
1-8" GATE VALVE, MJ
1-NIPPLE, LENGTH AS REQUIRED
1-8" FOSTER ADAPTER

WETLAND IMPACT = 3,357± SF

EXISTING STONE WALL:
PLACE STONES THAT WILL BE DISTURBED CAREFULLY ASIDE
AND RESTORE STONEWALL AFTER COMPLETION OF WORK.

12' PRIMARY
STRUCTURE SETBACK
(TYP.)

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Last Saved: 12/7/2020
Plotted: Dec 07, 2020 - 2:03pm By: BJL
Tighe & Bond: J:\A\A1000 AWC\83F-Mill Road PFAS Treatment Design\Drawings_Figures\AutoCAD\Sheet\A1000-83F_C-101_Site Piping.dwg

Xref ..\Xref\A1000-83A-Border.dwg

Tighe&Bond

50% DESIGN NOT FOR CONSTRUCTION

Aquarion Water Company of New Hampshire

Mill Road
Wellfield
PFAS Treatment

North Hampton,
New Hampshire

MARK	DATE	DESCRIPTION

PROJECT NO:	A1000-83F
DATE:	12/XX/2020
FILE:	A1000-83F_C-101_Site Piping.dwg
DRAWN BY:	HRB
CHECKED BY:	JRC
APPROVED BY:	PJG

PROPOSED SITE PLAN

SCALE: AS SHOWN

C-101
SHEET X OF XX

Appendix B

Conceptual Costs

WELL 6 PFAS TREATMENT - 8' VESSEL SINGLE PAIR EXISTING GARAGE
NORTH HAMPTON, NEW HAMPSHIRE
OPINION OF PROBABLE CONSTRUCTION COST
AQUARION WATER COMPANY OF NEW HAMPSHIRE

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	INSTALLATION	TOTAL
1.	**Site Work**						**$227,051**
	8" Water Main to Future Connection of Wells 9 and 11	LF	820	$110	$90,200	N/A	$90,200
	16" Water Main Installation from Future connection to Garage and Garage to Treated Water main to Mill Road	LF	475	$155	$73,625	N/A	$73,625
	8" Wye	EA	1	$320	$320	N/A	$320
	8" Gate Valves	EA	4	$1,250	$5,000	N/A	$5,000
	8" 45 Degree Bends	EA	4	$180	$720	N/A	$720
	8" 90 Degree Bends	EA	1	$220	$220	N/A	$220
	8" x 16" Reducer	EA	2	$375	$750	N/A	$750
	16" Tee	EA	3	$1,300	$3,900	N/A	$3,900
	16" Gate Valve	EA	3	$1,700	$5,100	N/A	$5,100
	16" 45 Degree Bend	EA	4	$650	$2,600	N/A	$2,600
	16" x 10" Reducer	EA	2	$300	$600	N/A	$600
	10" Gate Valve	EA	2	$1,500	$3,000	N/A	$3,000
	Hydrant	EA	1	$5,500	$5,500	N/A	$5,500
	Gas Main	LF	550	$40	$22,000	N/A	$22,000
	Communication Conduit	LF	500	$20	$10,000	N/A	$10,000
	Clearing and Grubbing	SF	1172	$3	$3,516	N/A	$3,516
2.	**Building**						**$193,300**
	Concrete Equipment Pads	CY	4	$900	$3,600	N/A	$3,600
	Roof Replacement	LS	1	$80,000	$80,000	N/A	$80,000
	HVAC Equipment	LS	1	$18,600	$18,600	N/A	$18,600
	Building Lighting	LS	1	$12,100	$12,100	N/A	$12,100
	Building Insulation	SF	2800	$15	$42,000	N/A	$42,000
	Garage Door Upgrades	LS	1	$25,000	$25,000	N/A	$25,000
	Demolition of Storage Room	LS	1	$12,000	$12,000	N/A	$12,000
3.	**Process Equipment**						**$371,750**
	8' PFAS Vessels and Valve Rack (One Pair)	EA	1	$250,000	$250,000	$37,500	$287,500
	Spray Insulation for PFAS Vessels and Valve Rack	SF	1770	$25	$44,250	N/A	$44,250
	Integration	LS	1	$40,000	$40,000	N/A	$40,000
					SUBTOTAL		**$792,101**
4.	**General Conditions - 15%**						**$118,815**
					CONSTRUCTION - SUBTOTAL		**$910,916**
5.	**Contingency - 20% (Excluding GAC Vessels)**						**$132,183**
6.	**Design and Construction Phase Engineering - 15%**						**$156,465**
					TOTAL		**$1,199,564**
					SAY		**$1,200,000**

Annual O&M Costs

1.	Backwash						$2,000
	Frac Tank Rental	LS	1	$1,500	$1,500	N/A	$1,500
	Frac Tank Pump Out	LS	1	$500	$500	N/A	$500
2.	Media Replacement	lb.	15000	$2.35	$35,250	N/A	$35,250
3.	Water Quality Sampling	LS	1	$21,000	$21,000	N/A	$21,000
4.	Natural Gas	LS	1	$2,000	$2,000	N/A	$2,000
						Total	$60,250

This is an engineer's Opinion of probable Construction Cost (OPCC). Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Opinion of Probable Construction Costs are made on the basis of the Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this Opinion of the Probable Construction Cost.

Tighe&Bond

WELL 6 PFAS TREATMENT - 8' VESSEL TWO PAIR EXISTING GARAGE
NORTH HAMPTON, NEW HAMPSHIRE

OPINION OF PROBABLE CONSTRUCTION COST

AQUARION WATER COMPANY OF NEW HAMPSHIRE

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	INSTALLATION	TOTAL
1.	**Site Work**						**$227,051**
	8" Water Main to Future Connection of Wells 9 and 11	LF	820	$110	$90,200	N/A	$90,200
	16" Water Main Installation from Future connection to Garage and Garage to Treated Water main to Mill Road	LF	475	$155	$73,625	N/A	$73,625
	8" Wye	EA	1	$320	$320	N/A	$320
	8" Gate Valves	EA	4	$1,250	$5,000	N/A	$5,000
	8" 45 Degree Bends	EA	4	$180	$720	N/A	$720
	8" 90 Degree Bends	EA	1	$220	$220	N/A	$220
	8" x 16" Reducer	EA	2	$375	$750	N/A	$750
	16" Tee	EA	3	$1,300	$3,900	N/A	$3,900
	16" Gate Valve	EA	3	$1,700	$5,100	N/A	$5,100
	16" 45 Degree Bend	EA	4	$650	$2,600	N/A	$2,600
	16" x 10" Reducer	EA	2	$300	$600	N/A	$600
	10" Gate Valve	EA	2	$1,500	$3,000	N/A	$3,000
	Hydrant	EA	1	$5,500	$5,500	N/A	$5,500
	Gas Main	LF	550	$40	$22,000	N/A	$22,000
	Communication Conduit	LF	500	$20	$10,000	N/A	$10,000
	Clearing and Grubbing	SF	1172	$3	$3,516	N/A	$3,516
2.	**Building**						**$193,300**
	Concrete Equipment Pads	CY	4	$900	$3,600	N/A	$3,600
	Roof Replacement	LS	1	$80,000	$80,000	N/A	$80,000
	HVAC Equipment	LS	1	$18,600	$18,600	N/A	$18,600
	Building Lighting	LS	1	$12,100	$12,100	N/A	$12,100
	Building Insulation	SF	2800	$15	$42,000	N/A	$42,000
	Garage Door Upgrades	LS	1	$25,000	$25,000	N/A	$25,000
	Demolition of Storage Room	LS	1	$12,000	$12,000	N/A	$12,000
3.	**Process Equipment**						**$659,250**
	8' PFAS Vessels and Valve Rack (Two Pairs)	EA	2	$250,000	$500,000	$75,000	$575,000
	Spray Insulation for PFAS Vessels and Valve Rack	SF	1770	$25	$44,250	N/A	$44,250
	Integration	LS	1	$40,000	$40,000	N/A	$40,000
					SUBTOTAL		**$1,079,601**
4.	**General Conditions - 15%**						**$161,940**
					CONSTRUCTION - SUBTOTAL		**$1,241,541**
5.	**Contingency - 20%**						**$248,308**
6.	**Design and Construction Phase Engineering - 15%**						**$223,477**
					TOTAL		**$1,713,327**
					SAY		**$1,713,000**

O&M Costs

1.	Backwash						$2,000
	Frac Tank Rental	LS	1	$1,500	$1,500	N/A	$1,500
	Frac Tank Pump Out	LS	1	$500	$500	N/A	$500
2.	Media Replacement	lb.	15000	$2.35	$35,250	N/A	$35,250
3.	Water Quality Sampling	LS	1	$21,000	$21,000		$21,000
4.	Natural Gas	LS	1	$2,000	$2,000		$2,000
						Total	$60,250

This is an engineer's Opinion of probable Construction Cost (OPCC). Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Opinion of Probable Construction Costs are made on the basis of the Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this Opinion of the Probable Construction Cost.

WELL 6 PFAS TREATMENT - 8' VESSEL SINGLE PAIR NEW BUILDING
NORTH HAMPTON, NEW HAMPSHIRE
OPINION OF PROBABLE CONSTRUCTION COST
AQUARION WATER COMPANY OF NEW HAMPSHIRE

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	INSTALLATION	TOTAL
1.	**Site Work**						**$124,644**
	8" Water Main to and From PFAS Vessels	LF	150	$180	$27,000	N/A	$27,000
	8" Wye	EA	1	$320	$320	N/A	$320
	8" Butterfly Valves	EA	5	$1,500	$7,500	N/A	$7,500
	8" 45 Degree Bends	EA	3	$180	$540	N/A	$540
	8" 90 Degree Bends	EA	2	$220	$440	N/A	$440
	8" Tee	EA	1	$320	$320	N/A	$320
	Hydrant	EA	1	$5,500	$5,500	N/A	$5,500
	Gas Main	LF	285	$40	$11,400	N/A	$11,400
	Electrical Service to Building	LS	1	$57,800	$57,800	N/A	$57,800
	Clearing and Grubbing	SF	1728	$8	$13,824	N/A	$13,824
2.	**Building**						**$160,437**
	Concrete Building Slab	CY	83	$900	$74,667	N/A	$74,667
	Insulated Metal Building	SF	988	$50	$52,150	N/A	$52,150
	HVAC Equipment	LS	1	$18,600	$18,600	N/A	$18,600
	Building Lighting	SF	988	$5	$4,940	N/A	$4,940
	Chain Link Fence	LF	168	$60	$10,080	N/A	$10,080
3.	**Process Equipment**						**$295,000**
	8' PFAS Vessels and Valve Rack	LS	1	$225,000	$225,000	$45,000	$270,000
	Spray Insulation for PFAS Vessels and Valve Rack	SF	1000	$25	$25,000	N/A	$25,000
4.	**General Conditions - 15%**						**$87,012**
			CONSTRUCTION - SUBTOTAL				**$667,093**
5.	**Contingency - 20%**						**$133,419**
6.	**Design and Construction Phase Engineering - 15%**						**$120,077**
					TOTAL		**$920,588**
					SAY		**$921,000**

O&M Costs

1.	Backwash						$1,000
	Frac Tank Delivery and Pickup	LS	0.5	1500	$750	N/A	$750
	Frac Tank Pump Out	LS	0.5	$500	$250	N/A	$250
2.	Media Replacement	lb.	9481	$2.35	$22,279	N/A	$22,279
3.	Water Quality Sampling	LS	1	$21,000	$21,000	N/A	$21,000
4.	Natural Gas	LS	1	$2,000	$2,000	N/A	$2,000
						Total	$46,279

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Tighe&Bond

WELL 6 PFAS TREATMENT - 12' SINGLE VESSEL NEW BUILDING
NORTH HAMPTON, NEW HAMPSHIRE
OPINION OF PROBABLE CONSTRUCTION COST
AQUARION WATER COMPANY OF NEW HAMPSHIRE

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	INSTALLATION	TOTAL
1.	**Site Work**						**$124,644**
	8" Water Main to and From PFAS Vessels	LF	150	$180	$27,000	N/A	$27,000
	8" Wye	EA	1	$320	$320	N/A	$320
	8" Butterfly Valves	EA	5	$1,500	$7,500	N/A	$7,500
	8" 45 Degree Bends	EA	3	$180	$540	N/A	$540
	8" 90 Degree Bends	EA	2	$220	$440	N/A	$440
	8" Tee	EA	1	$320	$320	N/A	$320
	Hydrant	EA	1	$5,500	$5,500	N/A	$5,500
	Gas Main	LF	285	$40	$11,400	N/A	$11,400
	Electrical Service to Building	LS	1	$57,800	$57,800	N/A	$57,800
	Clearing and Grubbing	SF	1728	$8	$13,824	N/A	$13,824
2.	**Building**						**$215,073**
	Concrete Building Slab	CY	116	$900	$104,533	N/A	$104,533
	Insulated Metal Building	SF	1410	$50	$73,250	N/A	$73,250
	HVAC Equipment	LS	1	$18,600	$18,600	N/A	$18,600
	Building Lighting	SF	1410	$5	$7,050	N/A	$7,050
	Chain Link Fence	LF	194	$60	$11,640	N/A	$11,640
3.	**Process Equipment**						**$297,500**
	12' PFAS Vessels and Valve Rack	LS	1	$225,000	$225,000	$45,000	$270,000
	Spray Insulation for PFAS Vessels and Valve Rack	SF	1100	$25	$27,500	N/A	$27,500
					$0	N/A	$0
					SUBTOTAL		**$637,217**
4.	**General Conditions - 15%**						**$95,583**
					CONSTRUCTION - SUBTOTAL		**$732,800**
5.	**Contingency - 20%**						**$146,560**
6.	**Design and Construction Phase Engineering - 15%**						**$131,904**
					TOTAL		**$1,011,264**
					SAY		**$1,011,000**

O&M Costs

1.	Backwash						$1,000
	Frac Tank Delivery and Pickup	LS	0.5	1500	$750	N/A	$750
	Frac Tank Pump Out	LS	0.5	$500	$250	N/A	$250
2.	Media Replacement	lb.	9481	$2.35	$22,279	N/A	$22,279
3.	Water Quality Sampling	LS	1	$21,000	$21,000	N/A	$21,000
4.	Natural Gas	LS	1	$2,000	$2,000	N/A	$2,000
						Total	$46,279

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Attachment C

Mill Road PFAS Preliminary Treatment Analysis

(September 2019)

Mill Road PFAS Preliminary Treatment Analysis

Results from Bench-Scale and Pilot-Scale PFAS Testing

Prepared for:

Aquarion Water Co. of New Hampshire

Revised September 24, 2019

Tighe&Bond
Engineers | Environmental Specialists

Table of Contents

Executive Summary

Delivering safe drinking water is Aquarion Water Company's (Aquarion's) highest priority. Aquarion is continuing to monitor Per- and Polyfluoroalkyl Substances (PFAS) concentrations in their production wells and distribution system. In recent years, the analytical techniques for PFAS in water have improved and they can now be detected at the very low concentration of nanograms per liter (ng/L), or parts per trillion. As a result, they are being more commonly detected in groundwater and drinking water supplies.

The United States Environmental Protection Agency (USEPA) has developed a drinking water health advisory level of 70 ng/L for Perfluorooctanoic acid (PFOA) and Perfluorooctane-sulfonate (PFOS), combined or individually, with the goal of protecting the most sensitive populations from a lifetime of exposure with an appropriate margin of safety. Many states have regulated, or are in the process of regulating, PFOA and PFOS as well as other PFAS compounds. The New Hampshire Joint Legislative Committee on Administrative Rules (JLCAR) has recently approved Maximum Contaminant Levels (MCLs) for four PFAS compounds:

- PFHxS: 18 ng/L
- PFOA: 12 ng/L
- PFOS: 15 ng/L
- PFNA: 11 ng/L

The new rules are scheduled to become effective on October 1, 2019 in New Hampshire. Compliance with the regulations is based on the PFAS concentration in water samples collected at the entry point to the distribution system, as opposed to samples collected at individual wells. All wells are required to be online during sampling.

PFAS have been detected in 15 of the 16 wells supplying Aquarion's New Hampshire System, with the highest concentrations in the Mill Rd Wells. Although the water from Well 6 exceeds the PFOA MCL, the PFAS concentrations in the water delivered to customers from the Mill Road wellfield (that is, the "entry point") is below the new regulatory limits because we blend the water from six wells prior to delivering the water to the distribution system.

Within the distribution system, all PFAS concentrations have been below the NH regulatory limits and total PFAS concentrations have been below 44 ng/L. Well 6 has had the highest concentrations of PFAS of any of Aquarion's wells with a total PFAS concentration up to 177 ng/L. In October 2017, Aquarion expanded the PFAS analysis from 14 to 26 PFAS compounds. The expanded list identified two additional PFAS compound (PFBA and PFPeA) in Aquarion's wells.

Based on the most recent PFAS concentrations in the well water, it is estimated that current operations with no treatment will keep all of the regulated PFAS to less than 10 ng/L individually and total PFAS concentration in the water from the Mill Road Wellfield to below 57 ng/L (Table ES-1). The wellfield operating strategy will limit Well 6 operation during normal operation to only when it is needed to meet demand or for compliance sampling.

To decrease PFAS concentrations further, treatment of the well water will be necessary. Aquarion conducted bench-scale and pilot-scale testing to evaluate the performance of GAC and ion exchange (IX) to remove the PFAS compounds present in the Mill Rd wellfield. The results of the bench-scale testing indicate:

- GAC and IX were able to remove all PFAS compounds to <4 ng/L.
- Unregulated shorter chain perfluorinated carboxylic acids (PFBA and PFPeA) were the first compounds to breakthrough treatment. GAC was more effective for removing the shorter chain compounds.
- IX was more effective (i.e., higher capacity) than GAC for removing the regulated PFAS.
- GAC or IX replacement frequency will be dependent on the target treated water quality goal.
- GAC was selected for developing preliminary costs estimates. IX can be considered if current or future resins can provide a lower life cycle cost.

A preliminary design was developed to refine PFAS treatment costs. GAC was the selected treatment technology but the system would be flexible to be converted to IX, if advances in resin technologies improve shorter chain PFAS removal performance. The preliminary design assumed a phased construction approach. The first phase would treat only Well 6 with the flexibility to expand to treat all Mill Rd wells. It was assumed that only Wells 6, 9 and 11 would be treated under the expansion but flexible piping configurations were included to allow treatment of Wells 8A, 20, and 21, if required.

- Treating just the water from Well 6 (Treatment Phase 1) is estimated to reduce the maximum total PFAS concentrations in the water leaving the Mill Road Wellfield to between approximately 28 and 50 ng/L when all wells are in operation depending on the treated water quality goal for changing out the GAC media. This scenario is estimated to require a rate increase of approximately 8% because of the need to construct a treatment facility and increases in annual O&M costs.

- Treating the water from Well 6, 9, and 11 (Treatment Phase 2) is estimated to reduce the maximum total PFAS concentrations in the water leaving the Mill Road Wellfield to below 4 ng/L to 42 ng/L when all wells are in operation depending on the treated water quality goal for changing out the GAC media. Actual concentrations may be lower depending on well operation. This scenario is estimated to result in a rate increase of approximately 13-16% because of the need to construct a larger treatment facility and more significant increases in annual O&M costs.

The data and costs presented are based on 2019 costs, PFAS concentrations, historical wellfield operation, and regulations. Actual costs may vary depending on changes to PFAS concentrations, regulations, costs, and operational changes.

Table ES-1
Summary of Estimated PFAS Concentrations in Water Entering the Distribution System from Mill Road Wells and Preliminary Costs Based on GAC Treatment

	No Treatment	Treatment Phase 1 Well 6		Treatment Phase 2 Wells 6, 9, 11	
	All Wells Online[5]	16,000 Bed Volume Treated Changeout Frequency[6]	75,000 Bed Volume Treated Changeout Frequency[7]	16,000 Bed Volume Treated Changeout Frequency[6]	75,000 Bed Volume Treated Changeout Frequency[7]
Treated water flow rate (gpm)	0	360	360	1,676	1,676
Combined PFOA concentration at the POE (ng/L)	10	5	5	<4[1]	<4[2]
Combined PFOS concentration at the POE (ng/L)	<4[2]	<4	<4[2]	<4[1]	<4[2]
Combined PFHxS concentration at the POE (ng/L)	<4[2]	<4	<4[2]	<4[1]	<4[2]
Combined PFNA concentration at the POE (ng/L)	<4[2]	<4	<4[2]	<4[1]	<4[2]
Total PFAS concentration entering the distribution system (ng/L)[1]	57	28	50	<4[1]	42
Opinion of Probable Construction Costs (OPCC)[3]	$0M	$4.1M		$2.6M ($6.7M total for Phase 1 and 2)	
Preliminary annual O&M costs	$0M	$0.1M	$0.1M	$0.3M	$0.1M
Rate increase required[4]	0%	8%	8%	16%	13%

[1] Based on historical maximum concentration of PFAS in well waters in 2017-2019.
[2] Method Reporting Limit (MRL) assumed to be 4 ng/L. MRL is the lowest concentration that can be reported with a reasonable degree of accuracy and precision.
[3] OPCC have an expected accuracy of -20%/+30%.
[4] Rate increase is based on the preliminary OPCC and annual O&M costs for GAC treatment, actual rate increase required will depend on final capital and annual O&M costs.
[5] All wells online during high demand periods and for regulatory compliance sampling.
[6]Assumed changeout frequency of 16,000 bed volumes treated in order to target total PFAS concentrations less than the MRL.
[7] Assumed changeout frequency of 75,000 bed volumes treated in order to target PFOA, PFOS, PFNA, and PFHxS concentrations less than the MRL. Concentrations of other PFAS may be measurable.

Section 1
Introduction

Per- and Polyfluoroalkyl Substances (PFAS) are a group of man-made compounds that have extensive industrial and consumer product applications including fire fighting foams, non-stick surfaces, and surfactants. They are persistent in the environment and are water soluble, resulting in PFAS being found in groundwaters and surface waters across the country. PFAS compounds have been detected in 15 of the 16 wells supplying Aquarion's New Hampshire System. The highest concentrations have been detected in the Mill Road Wellfield.

The United States Environmental Protection Agency (USEPA) has developed a drinking water health advisory level of 70 ng/L for Perfluorooctanoic acid (PFOA) and Perfluorooctane-sulfonate (PFOS), combined or individually, with the goal of protecting the most sensitive populations from a lifetime of exposure with an appropriate margin of safety. USEPA established the health advisories for PFOA and PFOS based on the agency's assessment of the latest peer-reviewed science. Peer-reviewed science is limited for the majority of PFAS compounds for understanding potential toxicity risks. In 2016, New Hampshire had also adopted an Ambient Groundwater Quality Standard (AGQS) of 70 ng/L for PFOA and PFOS, combined or individually, to protect local groundwater supplies. However, New Hampshire has recently approved MCLs for PFOA, PFOS, PFHxS, and PFNA. The new rules are scheduled to become effective on October 1, 2019 in New Hampshire. Compliance with the regulations is based on the PFAS concentration in water samples collected at the entry point to the distribution system, as opposed to samples collected at individual wells. All well must be online for collection of compliance sampling.

Aquarion previously took the proactive step to evaluate potential alternatives for PFAS treatment for the Mill Rd Wells as summarized in the *Mill Road PFAS Treatment Analysis* (Tighe & Bond, 2017). Granular activated carbon (GAC) and ion exchange (IX) were identified as potential options for PFAS treatment and management. GAC and IX have been shown to be effective for PFAS treatment (Dickenson and Higgins, 2016; Dudley et al., 2015; Campos et al. 2017) but treatment efficiency can be site specific depending on the background water quality and PFAS compounds present in the source water. Bench and/or pilot-scale testing was recommended to better evaluate treatment performance given the site specific conditions at the Mill Road Wells.

The following analysis summarizes bench- and pilot-scale testing that were completed to better evaluate GAC and IX for PFAS treatment. The testing results were used to update PFAS treatment design criteria, develop a preliminary design, and update opinions of probable construction costs and annual operations and maintenance (O&M) costs for PFAS treatment.

The data and costs presented are based on 2019 costs, PFAS concentrations, historical wellfield operation, and regulations. Actual costs may vary depending on changes to PFAS concentrations, regulations, costs, and operational changes.

1.1 Existing Operations

Aquarion currently operates six wells located along Mill Road that have been, or may have the potential to be, impacted by elevated PFAS concentrations, including PFOA and PFOS. Figure 1-1 presents the well locations and Table 1-1 summarizes the historical production data for each well. The six wells are currently combined before a common point of entry (POE) to the distribution system.

Table 1-1

Mill Road Well Production Data (2011-2016)

Well	Consensus Yield[2] (gpm)	Max Daily Flow Rate (gpm)	Avg Daily Flow Rate (gpm)
Well 6	300	360	111
Wells 8A, 20, 21 Combined POE	533	426	169
Well 8A	172	256	86
Well 20[1]	170	166	23
Well 21[1]	190	188	61
Well 9	294	630	194
Well 11	500	686	245

[1] Wells 20 and 21 are not operated concurrently.

[2] Consensus yield is the NHDES approved maintainable yield from the well. Daily flow rates may exceed the consensus yield.

1.2 Regulations

At this writing, there is still no EPA Maximum Contaminant Level (MCL) for PFAS compounds. However, as previously mentioned, EPA has a published Health Advisory Level (HA) of 70 ng/L for PFOA and PFOS individually or combined. Furthermore, on February 14, 2019, EPA published a PFAS Action Plan indicating that EPA is moving forward to propose MCLs for PFOA and PFOS. Many states have regulated, or are in the process of regulating, PFOA and PFOS as well as other PFAS compounds (Table 1-2). The New Hampshire Joint Legislative Committee on Administrative Rules (JLCAR) has recently approved MCLs for four PFAS compounds: PFHxS, PFOA, PFOS, and PFNA. The new rules are scheduled to become effective on October 1, 2019 in New Hampshire. The four PFAS compounds regulated in NH are similar to the five PFAS compounds regulated in VT, MA and CT with the exception of PFHpA.

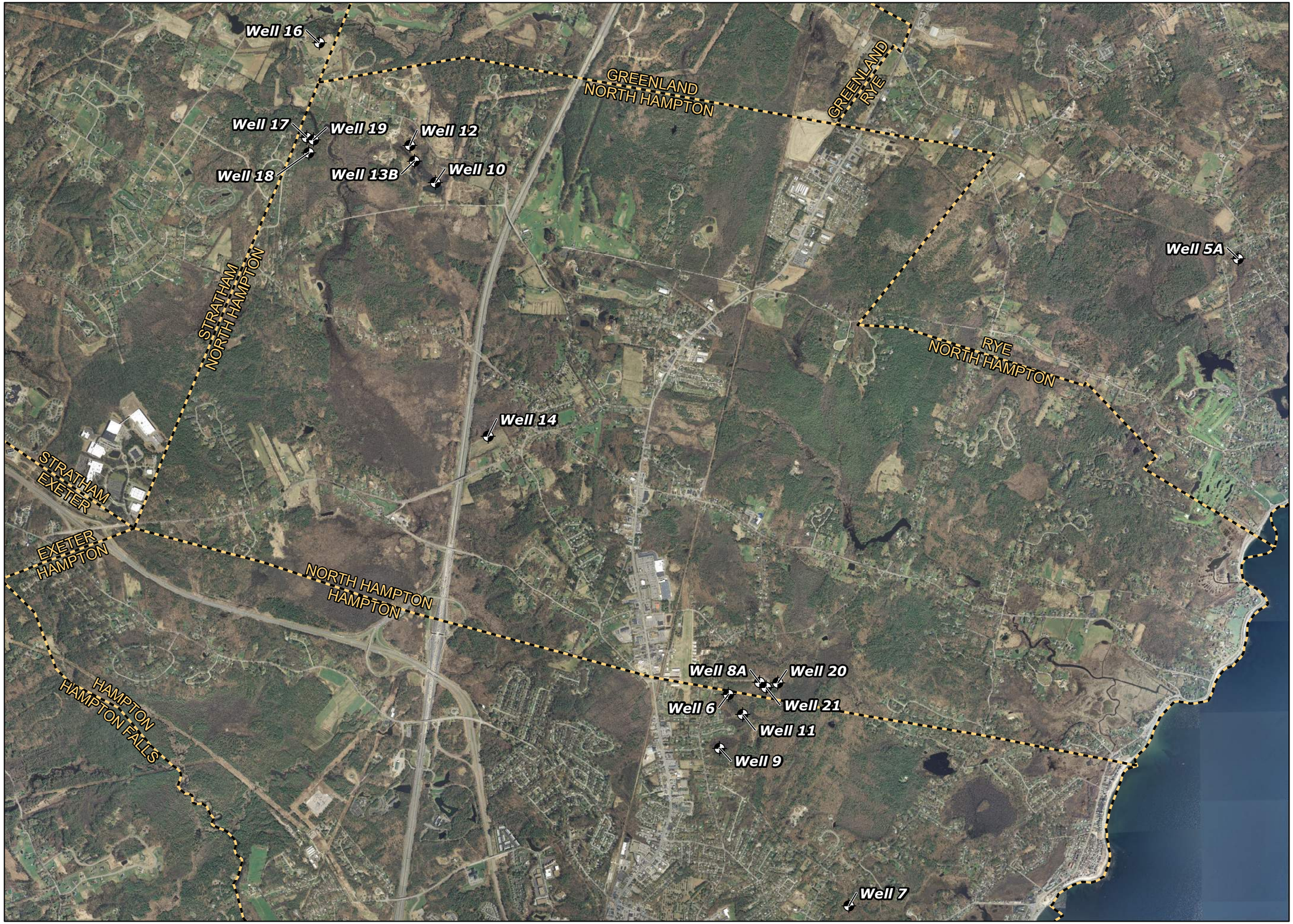
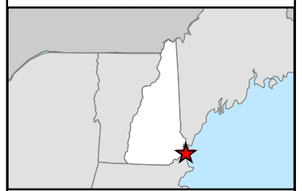


FIGURE 1-1
SITE OVERVIEW

LEGEND

- Well
- Town Boundary

LOCUS MAP



N

0 1,250 2,500
Feet
1:30,000

NOTES

1. Orthophotography courtesy of NH GRANIT (2010/2011).

Mill Road
Hampton & North Hampton
New Hampshire

September 2019

Tighe&Bond
Engineers | Environmental Specialists

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A-1000

Table 1-2
Example PFAS Regulations

State/Agency	PFAS Regulation
USEPA	PFOA and PFOS combined: 70 ng/L Health Advisory Level
Vermont	PFOA, PFOS, PFNA, PFHxS, PFHpA combined: 20 ng/L Health Advisory Level
New Jersey	PFOA: 14 ng/L Drinking Water Maximum Contaminant Level (Proposed) PFOS: 13 ng/L Drinking Water Maximum Contaminant Level (Proposed) PFNA: 13 ng/L Drinking Water Maximum Contaminant Level
New Hampshire	PFHxS: 18 ng/L Drinking Water Maximum Contaminant Level PFOA: 12 ng/L Drinking Water Maximum Contaminant Level PFOS: 15 ng/L Drinking Water Maximum Contaminant Level PFNA: 11 ng/L Drinking Water Maximum Contaminant Level
Maine	PFOA and PFOS combined: 70 ng/L Drinking Water Maximum Exposure Guidelines
Connecticut	PFOA, PFOS, PFNA, PFHxS, PFHpA combined: 70 ng/L Drinking Water Action Level for private wells
Massachusetts	PFOA, PFOS, PFNA, PFHxS, PFHpA combined: 70 ng/L Office of Research and Standards Guideline

1.3 PFAS Concentrations

Aquarion has continued extensive production well and distribution system monitoring for PFAS concentrations. Six PFAS compounds were originally analyzed under the Unregulated Contaminant Monitoring Rule (UCMR) in 2014 and 2015. As analytical methods have improved the number of PFAS compounds that can be analyzed has increased. Twelve to fourteen PFAS compounds were analyzed between July 2016 and September 2017. In October 2017, the PFAS analysis list was expanded to 26 compounds. The results of the expanded PFAS list were not available when the previous PFAS treatment evaluation was completed. With the expanded list, 10 PFAS compounds have been detected in the Mill Road Wellfield, including two that were previously not identified (i.e., PFBA, PFPeA, 6:2 FTS). Figure 1-2 through 1-6 present the NH regulated PFAS and total PFAS concentrations in the Mill Road production wells and Figure 1-4 presents the detected PFAS compounds in the most recent sample for Well 6 (February 2019), which has the highest measured concentrations of individual compounds as well as total concentrations. PFOA is the only PFAS that has been detected above the NH MCLs.

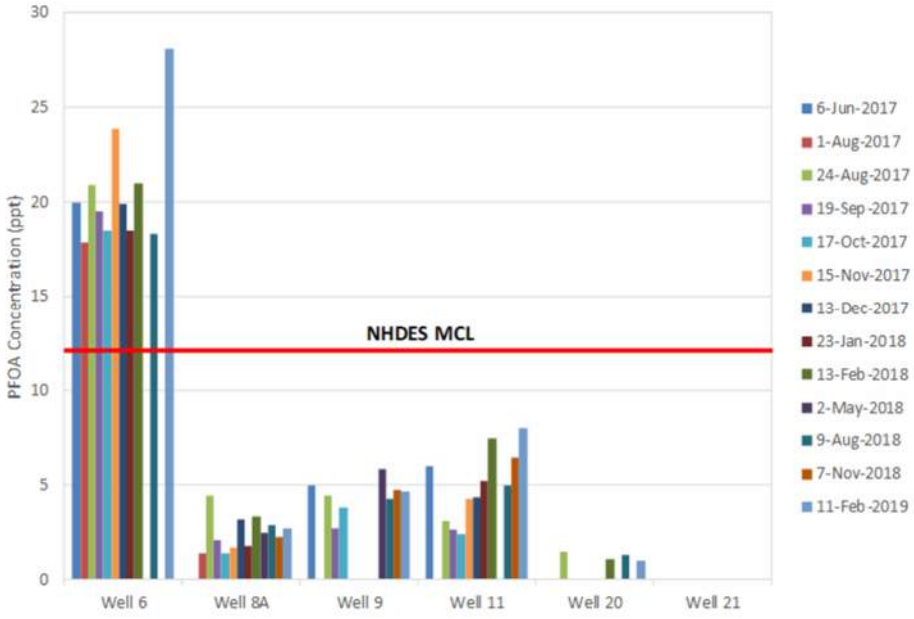

Figure 1-2 PFOA: Mill Rd Wells 2017 - 2019. (Note: Samples with non-detectable PFAS concentrations were assumed to be zero)

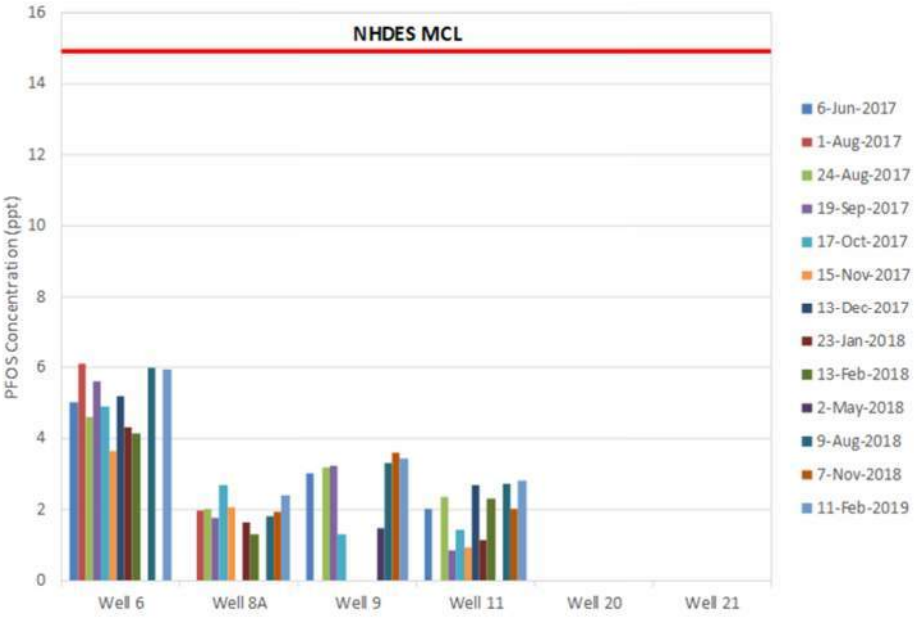

Figure 1-3 PFOS: Mill Rd Wells 2017 - 2019. (Note: Samples with non-detectable PFAS concentrations were assumed to be zero)

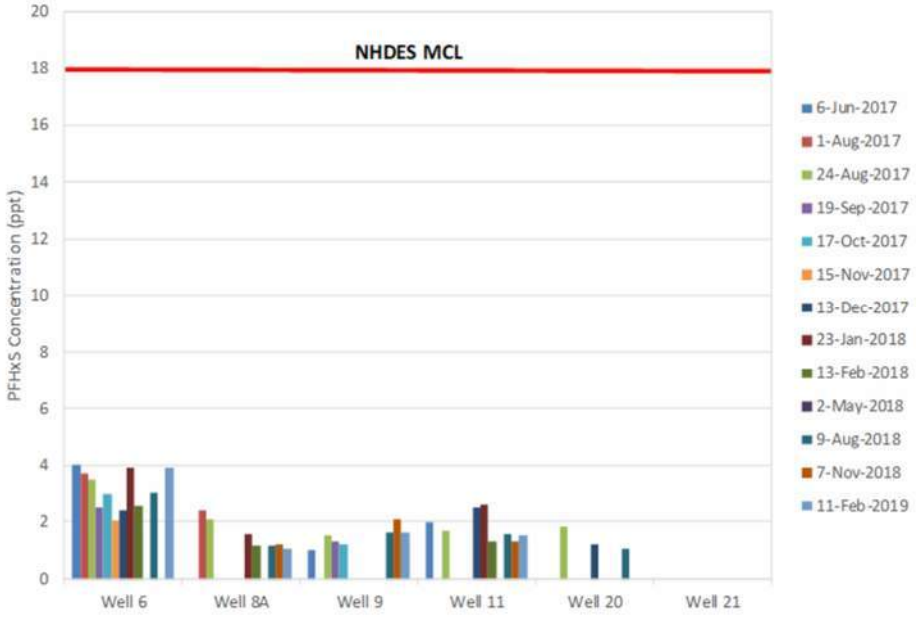

Figure 1-4 PFHxS: Mill Rd Wells 2017 - 2019. (Note: Samples with non-detectable PFAS concentrations were assumed to be zero)

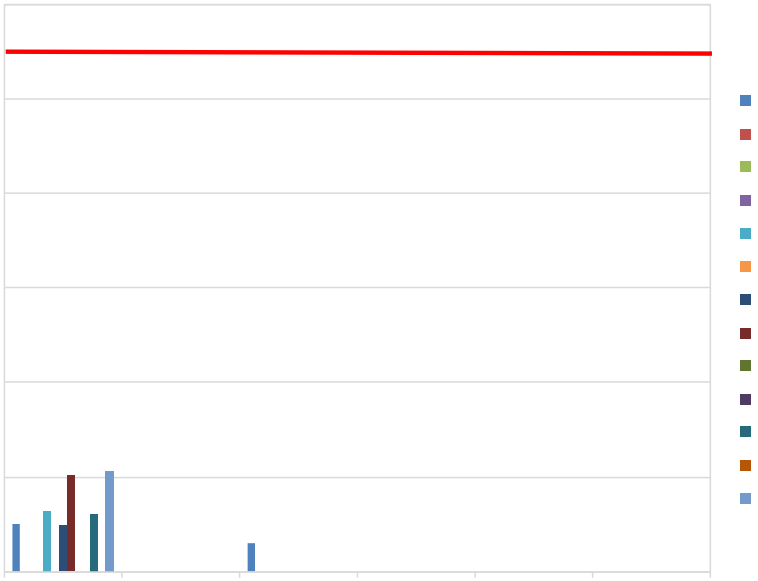

Figure 1-5 PFNA: Mill Rd Wells 2017 - 2019. (Note: Samples with non-detectable PFAS concentrations were assumed to be zero)

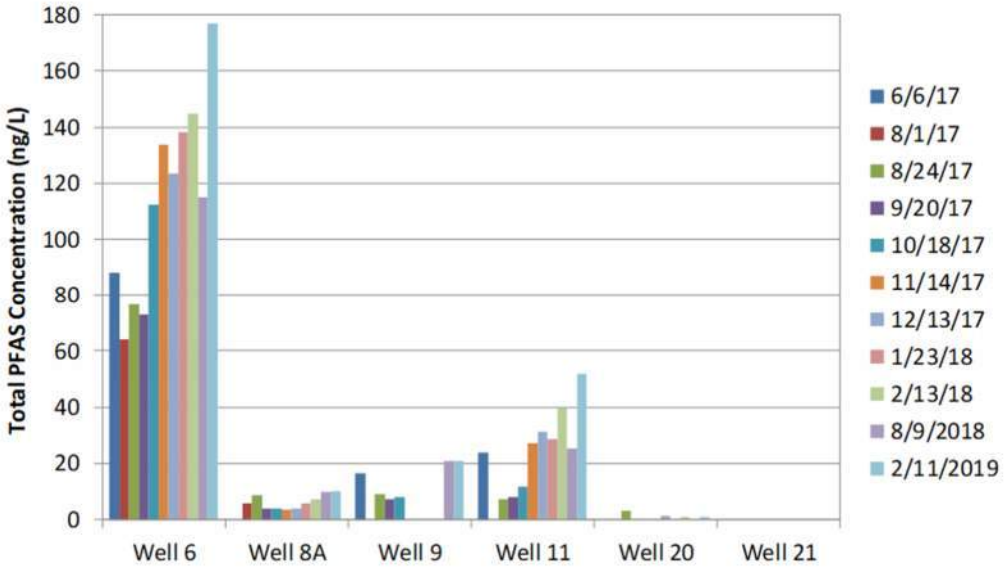

Figure 1-6 Total PFAS Concentrations in Mill Rd Wells 2017 - 2019. (Note: Samples with non-detectable PFAS concentrations were assumed to be zero. Samples prior to October 2017 were analyzed for 14 PFAS. Samples after October 2017 were analyzed for 26 PFAS)

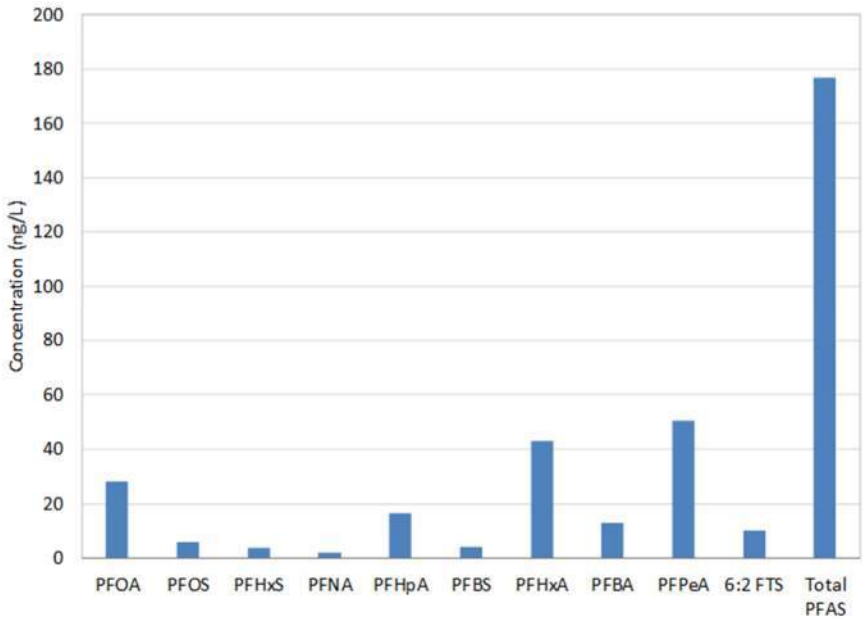

Figure 1-7 February 2019 PFAS Concentrations in Well 6

In June 2018, construction was completed for pipeline modifications that combine water from Wells 6, 8A, 9, 11, 20 and 21 prior to the entering the distribution system (Figure 1-8). These modifications allow all wells to be combined prior to any customers. Aquarion has been monitoring PFAS concentrations at sample locations within the distribution system to evaluate the water that customers are consuming. Concentrations of NH regulated compounds have been below the MCLs (Figure 1-9 to 1-12). Total PFAS concentrations have been below 30 ng/L (Figure 1-13).

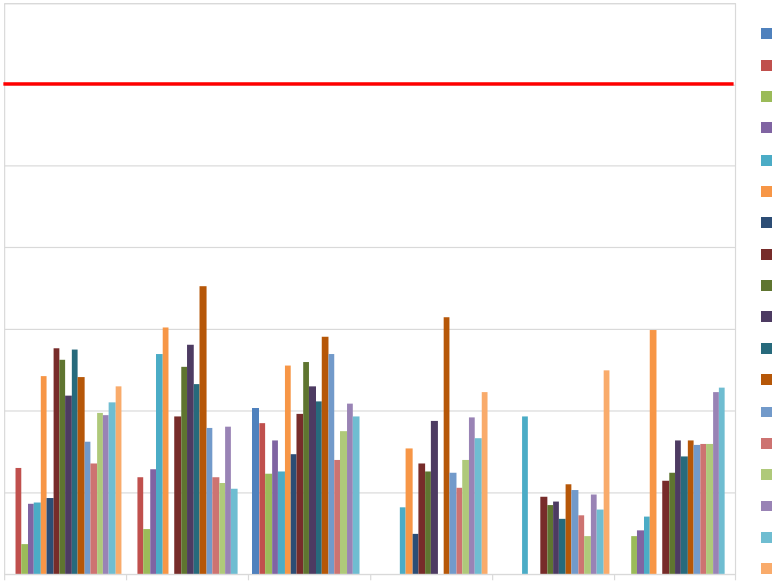

Figure 1-9 PFOA: Distribution System Sample Locations 2017-2019 (Note: Samples with non-detectable PFAS concentrations were assumed to be zero)

FIGURE 1-8
SITE OVERVIEW

LEGEND

- Active Well
- Mill Road Wellfield Water Main
- Water Main
- Water Treatment Plant
- Town Boundary

LOCUS MAP

N

0 150 300
Feet
1:3,000

NOTES

1. Orthophotography courtesy of GRANIT (2016).
2. The data in this map is provided by Aquarion. Water Company and is confidential - Do Not Copy or Distribute.

Mill Road
Hampton & North Hampton
New Hampshire

September 2019

Tighe&Bond
Engineers | Environmental Specialists

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A-1000

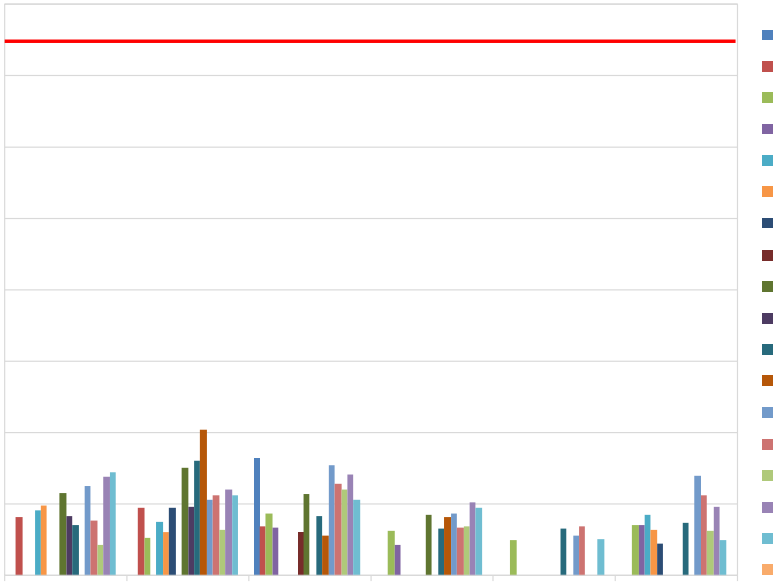

Figure 1-10 PFOS: Distribution System Sample Locations 2017-2019 (Note: Samples with non-detectable PFAS concentrations were assumed to be zero)

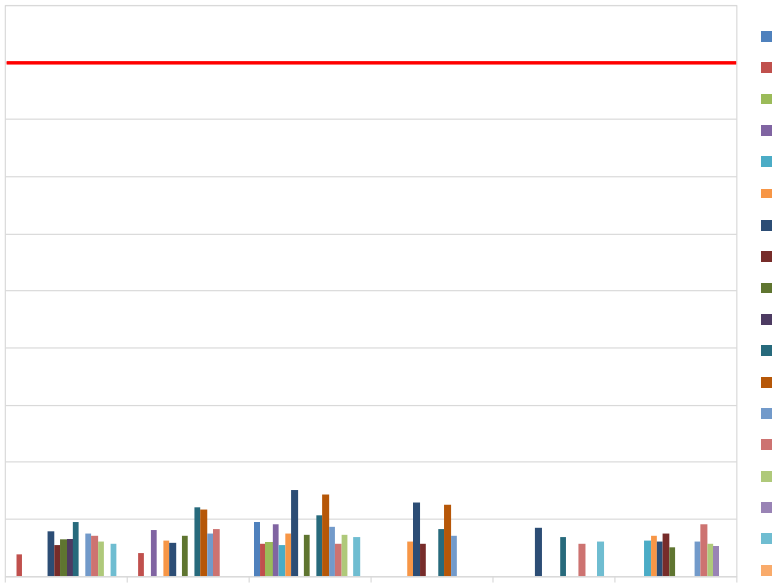

Figure 1-11 PFHxS: Distribution System Sample Locations 2017-2019 (Note: Samples with non-detectable PFAS concentrations were assumed to be zero)

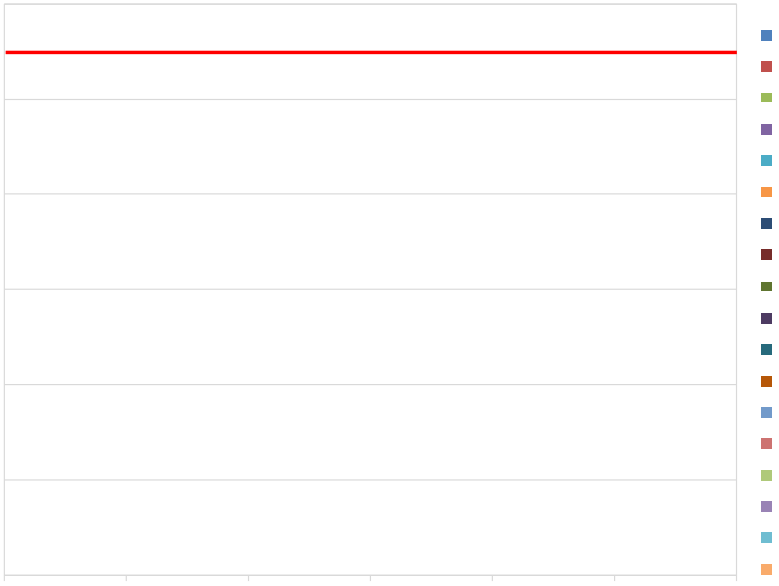

Figure 1-12 PFNA: Distribution System Sample Locations 2017-2019 (Note: Samples with non-detectable PFAS concentrations were assumed to be zero)

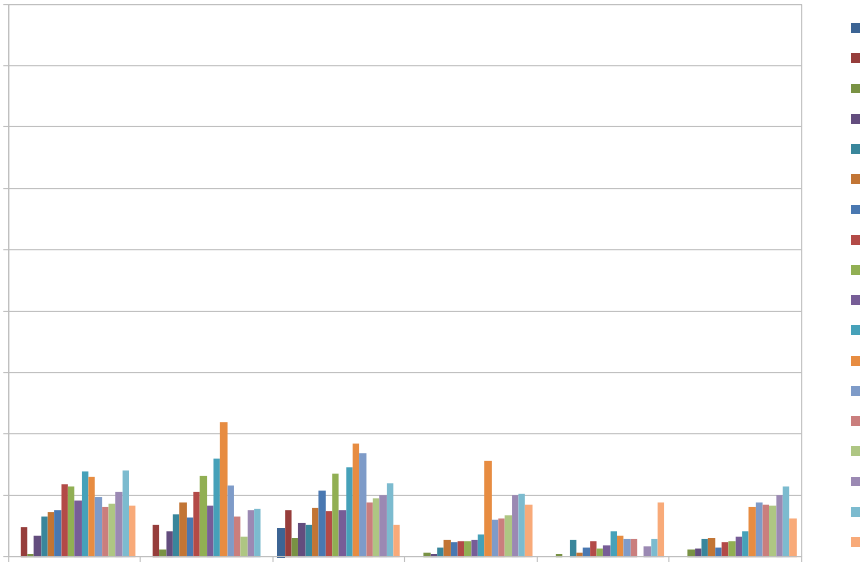

Figure 1-13 Total PFAS: Distribution System Sample Locations 2017-2018 (Note: Samples prior to October 2017 were analyzed for 14 PFAS. Samples after October 2017 were analyzed for 26 PFAS)

The Mill Road Wells have had detections of 10 different PFAS compounds in the overburden wells (i.e., Wells 6, 8A, 9 and 11). The bedrock wells (Wells 20 and 21) have only had two PFAS compounds detected, and each have had concentrations less than 2 ng/L.

PFAS consist of fluorinated carbon chains of varying lengths (Table 1-3). PFAS treatment technologies are generally more effective at removing the longer chain carbons (Dickson and Higgens, 2016). Perfluoroalkyl carboxylates with 7 or more carbons and perfluoroalkyl sulfonates with 6 or more carbons are considered long chain PFAS. Shorter carbon chain PFAS can be effectively removed but annual O&M costs for media replacement are higher.

Table 1-3

Detected PFAS in Mill Road Wells

Name	Abbreviation	Number of Carbons
Perfluorooctanoic acid	PFOA	8
Perfluorooctane-sulfonate	PFOS	8
6:2 Fluorotelomer sulfonate	6:2 FTS	8
Perfluorononanoic acid	PFNA	9
Perfluoroheptanoic acid	PFHpA	7
Perfluorohexane-sulfonate	PFHxS	6
Perfluorohexanoic acid	PFHxA	6
Perfluoropentanoic acid	PFPeA	5
Perfluorobutane-sulfonate	PFBS	4
Perfluorobutanoic acid	PFBA	4

The exact PFAS source for Aquarion's Mill Road wells is unknown at this time, but there are local sources that may be contributing to PFAS concentrations in the groundwater.

NHDES, with support from Aquarion, has also been sampling private wells in local communities to identify PFAS concentrations in the surrounding areas. To date, the highest total PFAS concentration detected in the private wells has been 103 ng/L. The data suggest that PFAS compounds are found throughout the area, but concentrations haven't been found to be higher than the Mill Rd production wells with the exception of samples taken directly at a local car wash.

Section 2
Bench-Scale Testing

Bench-scale testing was completed to develop site-specific GAC and IX usage rate estimates for the mixture of PFAS found in the Mill Road wells given the background water quality. The results include the relative breakthrough curves for detected PFAS compounds to assist with estimating changeout frequency for the full-scale system.

Testing utilized rapid small-scale column tests (RSSCTs) to evaluate GAC performance with design empty bed contact time (EBCT) of 10 minutes to simulate full-scale operation. EBCT represents the time that the water is in contact with the treatment media. RSSCTs are useful for estimating GAC usage rates utilizing shorter run times to minimize testing duration. Two types of GAC were tested based on full-scale experience for PFAS treatment:

- Filtrasorb 400 (F400 1240, Calgon Carbon) – a bituminous coal carbon
- Aquacarb® 1230CX (AC 1230CX, Evoqua Water Technologies) – an enhanced coconut shell carbon

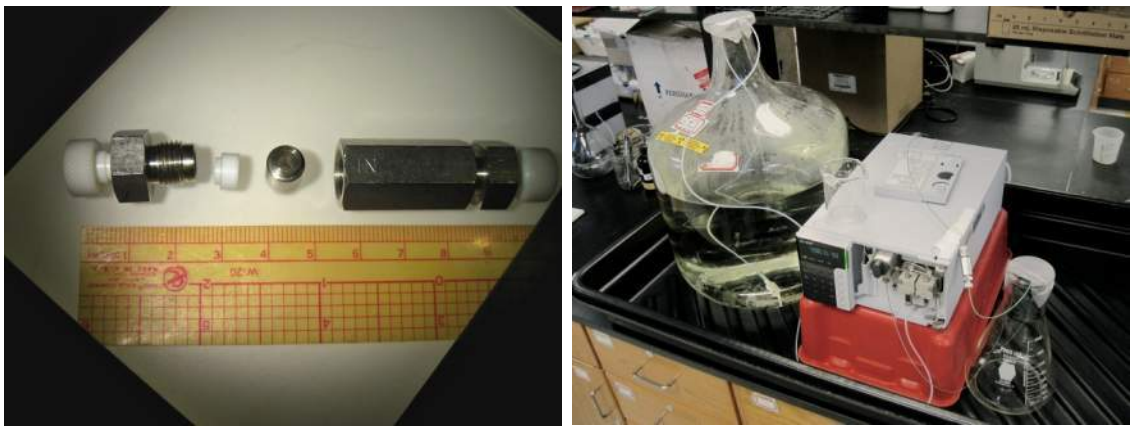

Figure 2-1 Example RSSCT Set-up (Courtesy of Dr. Knappe, NCSU)

The bench testing also evaluated PFAS removal with IX using Purolite PFA694 resin, which has been shown to be effective for shorter chain PFAS. IX testing evaluated performance based on an EBCT of 1.5 and 3.0 mins. 3 minutes of EBCT would require twice as much media to be installed as 1.5 minutes of EBCT.

Shorter chain PFAS were expected to be the first to breakthrough both GAC and IX. Testing also included a hybrid option of GAC followed by IX treatment. The hybrid approach was selected to evaluate if utilizing GAC to remove the longer chain PFAS upstream of IX can extend the life of the IX resin for the shorter chain PFAS.

Testing was completed on groundwater collected from Well 6 and shipped to North Carolina State University (NCSU) for testing. Testing was conducted by Dr. Detlef Knappe,

who is a national GAC and PFAS treatment expert. He was the principal or co-principal investigator on PFAS treatment, GAC treatment, and GAC scale-up reports for the Water Research Foundation.

To allow easier detection of PFAS breakthrough, approximately 40 ng/L of each of the detected PFAS compounds were spiked into the raw water. 40 ng/L was selected as it would represent doubling the two highest individual PFAS concentrations in Well 6 (PFPeA and PFHxA). Table 2-1 presents the average influent concentrations for the testing and the concentrations in the most recent Well 6 sample. Percent removal as a function of bed volumes will be independent of the influent PFAS concentrations, but the number of bed volumes that can be treated before reaching a given effluent PFAS concentration will be dependent on the influent concentration. The spiked concentrations have a minimal impact on the replacement frequency due to the concentrations being in ng/L or parts per trillion. Background organic matter, which has a concentration of mg/L or parts per million, can have a larger impact on the changeout frequency than minor changes to the PFAS concentrations. To normalize the data for potential changes in raw water PFAS concentrations, the data are presented as a ratio of concentration of the compounds in the source water (C_0) to the concentration in the treated water (C).

- $C/C_0 > 1$ represents a treated water concentration higher than the influent concentration
- $C/C_0 = 1$ represents a treated water concentration equal to the influent concentration
- $C/C_0 < 1$ represents a treated water concentration lower than the influent concentration, which indicated removal of PFAS compounds
- For example, a ratio of 0.5 for C/C_0 would represent a 50% breakthrough.

Table 2-1

Bench-scale Testing Spiked Raw Water PFAS Concentrations

PFAS	Well 6 Concentrations (ng/L)[1]	Average Bench-scale Testing Influent Concentration (ng/L)
PFBS	3.4	40
PFBA	10.3	68
PFHpA	14.4	66
PFHxS	2.6	46
PFHxA	41.7	86
PFNA	<4.3	46
PFOS	4.9	44
PFOA	21.7	77
PFPeA	46.0	104

[1] Collected 2/13/18

2.1 GAC Bench-Scale Testing Results

GAC media by two different vendors (F400 by Calgon Carbon and Aquacarb 1230CX by Evoqua) were tested to evaluate performance for PFAS removal with the site specific water quality. Both GAC media were effective for the two PFAS compounds currently regulated by NHDES (PFOA and PFOS) and the two additional PFAS compounds likely to be regulated by NHDES (PFNA and PFHxS) with no breakthrough measured after 75,000 or 120,000 bed volumes tested (Figure 2-2 and 2-3).

Shorter chain perfluoroalkyl carboxylates (i.e., PFBA, PFPeA) were the first PFAS compounds to breakthrough both GACs. The bituminous GAC (i.e. Calgon F400) was found to have a higher capacity for PFBA and PFPeA than the enhanced coconut carbon. The enhanced coconut carbon had measurable PFBA concentrations in the first sample after 10,000 bed volumes treated. The bituminous carbon didn't have measurable PFBA concentrations until approximately 20,000 bed volumes treated. The enhanced coconut carbon also had measurable breakthrough of PFHxA, PFBS, and PFHpA between 50,000 and 60,000 bed volumes treated. PFHxA and PFBS were not detected for the bituminous carbon until 120,000 bed volumes treated in the bench testing.

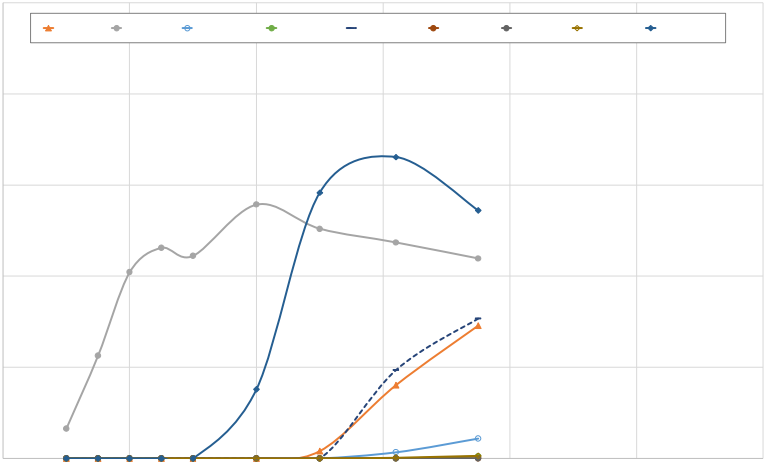

Figure 2-2 Enhanced Coconut Shell GAC Rapid Small-Scale Column Tests Results based on 10 Min Empty Bed Contact Time

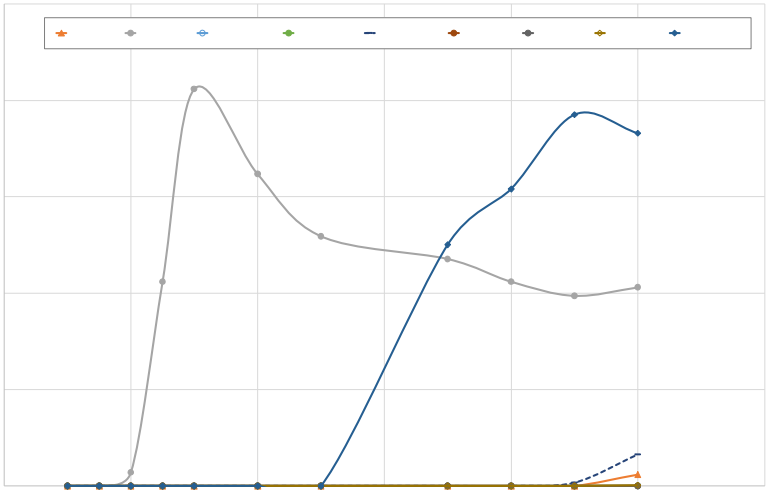

Figure 2-3 Bituminous Coal GAC Rapid Small-Scale Column Tests Results based on 10 min Empty Bed Contact Time

Based on the results of the bench-scale testing, bituminous based carbon is recommended for treatment at the full-scale. RSSCT testing is effective for identifying performance differences between carbons but can overpredict GAC performance compared to full-scale treatment in terms of bed volumes treated before breakthrough.

Breakthrough of PFBA and PFPeA also showed treated water concentrations that exceeded the influent concentrations after breakthrough (i.e., $C/C_0 > 1$) (Figures 2-2 and 2-3). The shorter chain PFAS compounds are loosely adsorbed to the carbon. These compounds can be displaced by compounds that are better adsorbed by the media. If treatment of PFBA is required, frequent GAC changeouts will be necessary to maintain concentrations below the method reporting limit (MRL). The USEPA and NHDES do not currently regulate PFBA or PFPeA. PFBA does have a drinking water guidance level of 7,000 ng/L in Minnesota.

2.2 Anion Exchange Bench-Scale Testing Results

A single IX resin was evaluated at the bench-scale for PFAS treatment efficiency. The testing included two EBCTs of 1.5 and 3 minutes and IX with 1.5 minutes of EBCT after GAC pre-treatment with 10 minutes EBCT. The EBCTs were selected to allow more bed volumes to be treated within the testing schedule. In the *Mill Road PFAS Treatment Analysis* (Tighe & Bond, 2017), an IX EBCT of 2.5 minutes was assumed for equipment sizing based on vendor recommendations. Vendor recommendations have been increased to 5 minutes EBCT based on more recent pilot test data at other facilities.

The bench-scale IX testing showed that longer EBCTs provided more efficient removal of PFAS compounds (Figure 2-4 and 2-5). Similar to GAC treatment, the shorter chain perfluoroalkyl carboxylates (i.e., PFBA, PFPeA) were the first PFAS compounds to breakthrough. The IX resin was ineffective for PFBA treatment with an EBCT of 1.5 or 3.0 minutes.

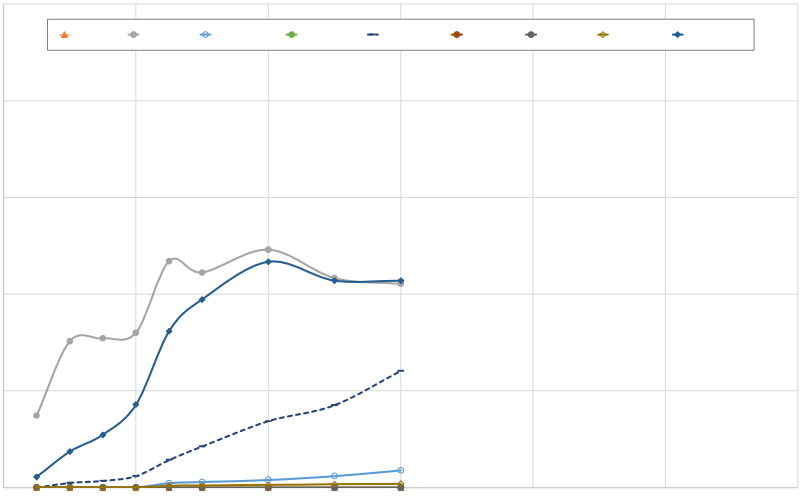

Figure 2-4 IX Results after 1.5 minute Empty Bed Contract Time

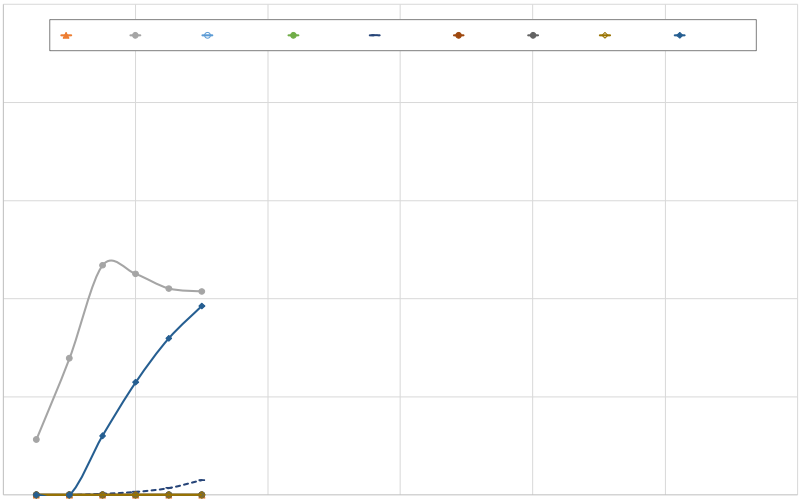

Figure 2-5 IX Results after 3.0 minute Empty Bed Contact Time

The treated water from the F400 GAC RSSCT column was also used to evaluate IX treatment performance in a hybrid system to evaluate if removing the longer chain carbons with GAC could improve the performance of the IX resin for the shorter chain PFAS compounds. Post-GAC IX treatment was shown to also be ineffective for PFBA removal with an EBCT of 1.5 mins (Figure 2-6). The PFBA concentrations in the IX treated water was equal to the GAC treated water indicating no removal through the IX column.

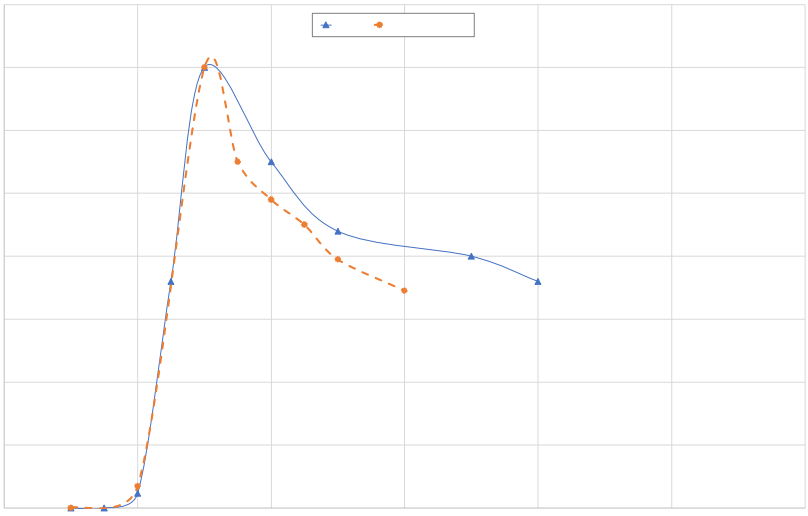

Figure 2-6 PFBA Concentration after GAC and Post-GAC IX Treatment

Section 3
Pilot-Scale Testing

Pilot-scale testing was completed to refine bench-scale testing results for the removal of PFAS compounds found in the Mill Road wells given the background water quality. Three IX resins (ECT2 LC1, LC3, and LC4) and one GAC media (Calgon Carbon F400) were evaluated in the pilot scale testing.

Each media was tested through four pilot-scale test columns in series that simulated full-scale EBCTs of 2.5, 5, 7.5, and 10 minutes. The test columns were 2 inches in diameter and were filled with 32 inches of media. Source water for the pilot was collected from a Well 6 monitoring well located outside the wellhouse. A submersible pump was used to pump water from the monitoring well to an equalization (EQ) tank. The test columns were housed in a Conex style box located outside the fence line of Well 6. Peristaltic metering pumps were used to pump water from the EQ tank to the test columns inside the Conex box at a target rate of 703.7 mL/min. Flow-rates were measured by F-2000 digital flowmeters and by rotameters. Figure 3-1 shows an example of the pilot scale test columns.

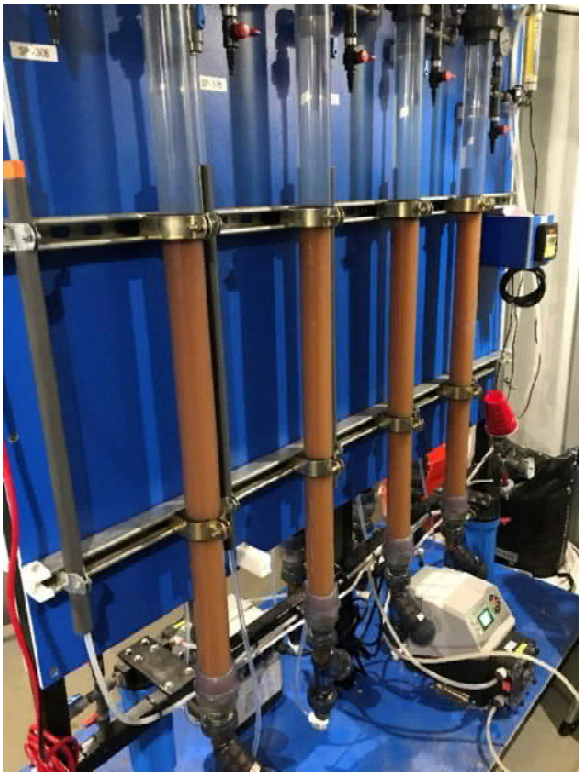

Figure 3-1: Example of Pilot-Scale Test Columns

Influent and treated water samples were collected every two weeks for PFAS analysis. PFAS analysis was normally conducted by Eurofins for 26 compounds according to the EPA 537 Version 1.1 Modified method. Once a month background water samples were also collected after the cartridge filter and submitted for analysis. Background water samples were analyzed for anions (chloride, bromide, sulfate, nitrate), iron, manganese, TOC,

alkalinity, hardness, and pH. Table 3-1 shows average background water quality over the course of pilot operation.

Table 3-1
Background Water Quality

Water Quality Parameter	Units	Average Value
Iron	mg/L	< 0.05
Manganese	mg/L	< 0.003
Bromide	mg/L	< 0.02
Chloride	mg/L	181.5
Nitrate Nitrogen	mg/L	3.4
Sulfate	mg/L	15.1
Total Organic Carbon	mg/L	< 0.6
pH	S.U.	7.3
Total Alkalinity ($CaCO_3$)	mg/L	48.6
Total Hardness ($CaCO_3$)	mg/L	150.2

3.1 Anion Exchange Pilot-Scale Testing Results

Three of ECT's IX resins (LC1, LC3, and LC4) were evaluated for PFAS removal with EBCTs of 2.5, 5, 7.5, and 10 minutes. The three resins were effective for the removal of long-chain PFAS compounds; however, shorter chain PFAS had relatively quick breakthrough. PFBA was the first PFAS compound to break through the three IX resins at approximately 8,000 bed volumes treated with an EBCT of 2.5 minutes (Figure 3-2).

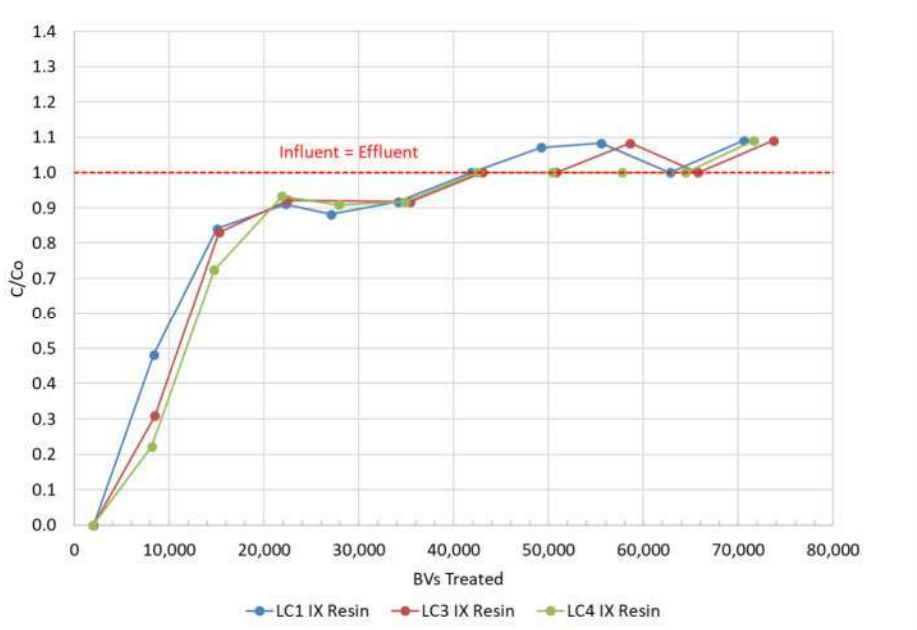

Figure 3-2 PFBA Breakthrough after 2.5 min EBCT for IX Resins

(C/C_0 is the ratio of treated water concentration to influent concentration.)

The LC4 resin was found to have a higher capacity for PFBA and PFPeA treatment than the LC1 and LC3 resins. For that reason, the columns with the LC1 and LC3 resins were shut down after approximately 70,000 bed volumes treated at 2.5 min EBCT and the LC4 column was kept running along with the GAC test column to compare treatment performance for regulated PFAS compounds. The LC4 IX resin was in operation for an additional 5 months and treated over 170,000 BVs. PFBA, PFPeA, PFHxA, and PFHpA were the only PFAS compounds to breakthrough the LC4 IX resin after a total of 174,532 treated BVs (Figure 3-3). No regulated compounds were detected after 2.5 min EBCT for the duration of the pilot. Based on ECT's internal data, it is estimated that PFOA will be the first NHDES regulated PFAS compound to breakthrough the IX treatment after 200,000+ BVs.

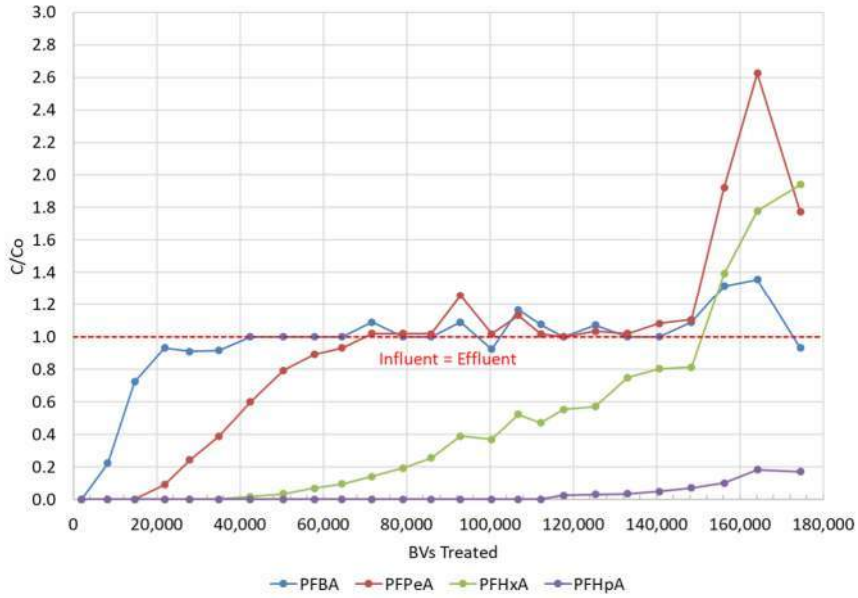

Figure 3-3 PFAS Breakthrough after 2.5 min EBCT for LC4 IX Resins

(C/C_0 is the ratio of treated water concentration to influent concentration.)

An important operating parameter when designing PFAS treatment systems is Empty Bed Contact Time (EBCT). An EBCT between 2 and 5 minutes is commonly used for IX resins. Bench-scale IX testing previously suggested that longer EBCTs provided more efficient removal of PFAS compounds; however, pilot-scale testing results indicated that PFBA and PFPeA are not dependent on EBCT. The impact of EBCT on longer chain PFAS compounds was not evaluated due to limited breakthrough at 5 min EBCT.

3.2 GAC Pilot-Scale Testing Results

Calgon Carbon F-400 media was also evaluated for PFAS removals with EBCTs of 2.5, 5, 7.5, and 10 minutes. The GAC treatment was effective for the removal of both short- and long-chain PFAS compounds. Similar to the IX resin, PFBA was the first PFAS compound to break through the GAC treatment after approximately 16,000 bed volumes treated (Figure 3-4). EBCT did not impact treatment performance of PFBA (Figure 3-4).

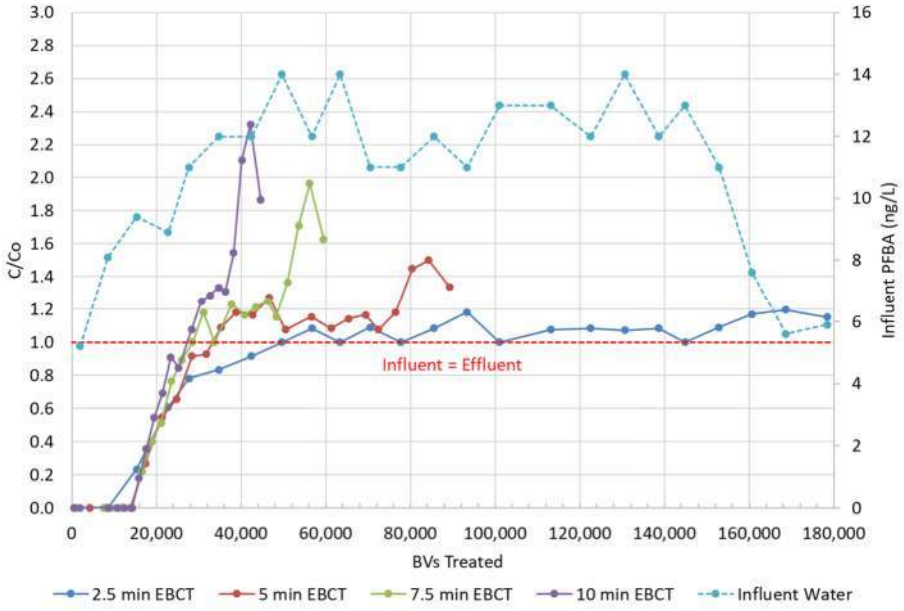

Figure 3-4 PFBA Breakthrough for GAC

(C/C_0 is the ratio of treated water concentration to influent concentration.)

PFOA was the first NHDES regulated PFAS compound to breakthrough the GAC treatment (Figure 3-5). Unlike PFBA, the capacity of the GAC to remove PFOA was impacted by EBCT. At 2.5 min EBCT, PFOA broke through the GAC treatment after 27,669 BVs, while at 5 min EBCT, breakthrough happened at 42,752 BVs. This represents a treatment improvement of approximately 15,000 BVs from 2.5 min EBCT to 5 min EBCT. At 7.5 min EBCT, PFOA had not yet broken through the GAC treatment after 59,457 BVs. It is projected that GAC treatment with 10 min EBCT will treat a minimum of 75,000 BVs before the breakthrough of PFOA.

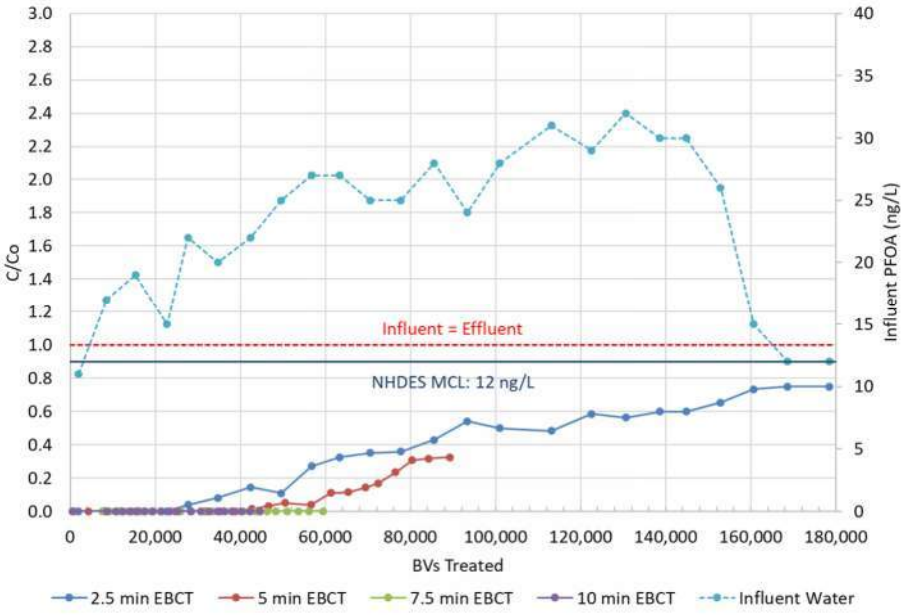

Figure 3-5 PFOA Breakthrough for GAC

($C/C_{0\ is\ the}$ ratio of treated water concentration to influent concentration.)

Section 4
Treatment Recommendations

Pilot-scale test results refined the bench-scale test results and provided more accurate expected breakthrough curves for PFAS compounds in the Mill Road Wells. Annual O&M costs for the full-scale system were estimated based on the pilot-scale testing results. Based on the pilot-scale testing results, GAC is the recommended treatment technology if treatment of all PFAS compounds is required. Both GAC and IX can be effective if the treatment goal is to target the four NHDES regulated compounds.

The GAC replacement frequency and associated annual O&M costs will depend on the selected PFAS treatment target. If the PFAS treatment goal is less than the detection limit (MRL) for all PFAS compounds, GAC changeout will be more frequent based on PFBA breakthrough. The pilot-scale test results showed up to 16,000 bed volumes treated before breakthrough of PFBA. Alternatively, if GAC replacement is based on maintaining the four NH regulated PFAS compounds below the MRL, the GAC changeout frequency can be extended. Breakthrough of these compounds was not measured in the 7.5 min EBCT GAC test column with up to 59,457 bed volumes treated. For this scenario, a GAC replacement frequency of 75,000 bed volumes was assumed for 10 min EBCT.

IX resin with an EBCT of 2.5 min can also be used to treat the four NH regulated PFAS compounds. Breakthrough of these compounds was not measured with up to 174,532 bed volumes treated. PFOA will likely be the first PFAS compound to breakthrough the IX treatment. For this scenario, an IX replacement frequency of 200,000 bed volumes was assumed. The IX treatment would require a smaller building than the GAC treatment, which directly impacts capital costs. However, as PFAS studies advance, regulations can quickly change, and a building that can support both media would be recommended. The pressure vessels can be designed to utilize either media for flexibility to adjust to future regulatory changes. The following preliminary sizing evaluation assumed GAC media as it would have a larger footprint. During detailed design, accommodations for IX media should be evaluated.

Section 5
PFAS Treatment Preliminary Design

PFAS concentrations vary between the wells, with the highest concentration in Well 6. Wells 6, 8A, 9, and 11 are overburden wells, while Wells 20 and 21 are deeper bedrock wells. PFAS concentrations in Wells 20 and 21 have primarily been below the PFAS method detection limits with the exception of two PFAS compounds. Two scenarios were evaluated for reducing the levels of PFAS compounds at the POE for the Mill Road Well field:

- No treatment: The Mill Road wells are combined prior to the POE to the distribution system and production from PFAS impacted wells is limited.
- GAC Water Treatment Plant (WTP): Provide PFAS treatment with flexibility to treat Well 6 only or all Mill Rd wells.

Due to uncertainty of future regulations, two treated water quality goals were evaluated for the GAC WTP. PFOA concentrations in Well 6 is the only PFAS to exceed the NH MCLs. To evaluate potential annual O&M cost impacts of treatment, the two evaluated treated water quality goals are:

- Total PFAS concentrations less than the MRL
- NH Regulated PFAS (PFOA, PFOS, PFNA, PFHxS) less than the MRL

The bench-scale and pilot-scale testing results showed that GAC is capable of achieving concentrations less than the MRL for the detected PFAS compounds and the GAC changeout frequency will depend on the treated water quality goal. The MRL is the lowest concentration that can be reported with a reasonable degree of accuracy and precision. MRLs for the PFAS detected in the Mill Road Wells range from approximately 2 to 4 ng/L. GAC changeout frequencies are assumed to range between 16,000 bed volumes if treating to maintain all PFAS concentrations below the MRLs and greater than 75,000 bed volumes if treating for the four PFAS compounds regulated in NH (i.e., PFOA, PFOS, PFNA, and PFHxS).

5.1 No Treatment

Infrastructure improvements completed in 2018 enable the combination of the water from Well 6 with water from Wells 8A, 9, 11, and 20 before releasing it to the distribution system. Compliance with the regulations is based on the PFAS concentration in water samples collected at the entry point to the distribution system, as opposed to samples collected at individual wells. All wells are required to be online during sampling. Based on the most recent test results, calculations indicate that the resultant PFAS concentrations entering the system with all six wells online should be less than 4 ng/L for each of the four NH regulated compounds with the exception of PFOA, which is estimated to be 10 ng/L with Well 6 in operation. Therefore, with Well 6 in service, the water entering the distribution system meets NHDES standards.

Table 5-1 presents the anticipated water concentrations at the POE to the distribution system with all wells combined based on the maximum historical PFAS concentration

measured in each well. Maximum historical concentrations were used in place of the most recent sample due to variability in PFAS concentrations.

Table 5-1

No Treatment Estimated Point of Entry PFAS Concentrations Based on Maximum Historical PFAS Concentrations (2017-2019)

	All Wells Online[1]
PFOA concentration at the POE (ng/L)	10
PFOS concentration at the POE (ng/L)	<4
PFHxS concentration at the POE (ng/L)	<4
PFNA concentration at the POE (ng/L)	<4
Total PFAS concentration at the POE (ng/L)	57

[1] Compliance sampling requires all wells online to be online during sampling

Well 6 is only run during high demand period and is the first well to be shutdown when demand decreases. This results in lower PFAS concentrations when demands allow However, there are trace levels in most wells in the water system. Leaving Well 6 off does not eliminate PFAS compounds in the tap water. Aquarion has implemented an operational strategy to minimize PFAS concentrations in the distribution system to the extent feasible.

5.2 GAC Preliminary Design Approach

A preliminary GAC WTP design was developed to better define capital and annual O&M cost opinions. The selected design approach was to provide the flexibility to treat only Well 6 under an initial phase to reduce costs, with the ability to expand the facility in the future. The GAC facility design includes:

- New 8" raw water pipeline to isolate water from Well 6.
- 16" raw and treated water pipelines for the combined flow rate.
- Piping and valving to allow Wells 8A, 20/21 to bypass treatment.
- A pre-fabricated metal building to house GAC vessels and facilitate expansion.
- Expansion of the metal building to include up to 4 pairs of GAC vessels for treatment of all wells.
- Insulated GAC vessels to minimize dehumification requirements.
- Underground tanks for storage and recycling of GAC backwash water.
- Cartridge filters to remove GAC fines from the backwash recycle.
- Replacement of the well pumps in Wells 6, 9, and 11 to restore lost capacity. Wells 9 and 11 will be replaced under Phase 2 of the project.

Well 6 currently has the highest PFAS concentrations. Well 9 and 11 also have elevated concentrations with Wells 8A, 20 and 21 having only minor PFAS detections (Figure 1-2). Piping will be provided to treat Well 6 only, Wells 6, 9, and 11, or all wells in order to optimize treatment costs. Under Phase 1, it is assumed that a metal building would be constructed to house a pair of GAC vessels to treat only Well 6 (Appendix A). The concrete pad and underground foundation built under the initial phase will be large enough for up

to 4 pairs of GAC vessels. This will provide the necessary piping and space to reduce the schedule for expanding the facility to treat all wells. The expansion would allow for treatment of all wells but it was assumed that only Wells 6, 9 and 11 would be treated to reduce annual O&M costs. The building is proposed to be located within the approximate footprint of the existing garage and driveway and is targeted to result in a net neutral impact on imperious surfaces. Stormwater management beyond managing the runoff from the roof through infiltration trenches behind the proposed building was assumed to not be required due to no change in impervious surface area. Final location to be determined during detailed design.

The new GAC treatment facility will add additional head loss to the system, which will result in decreased production from the existing wells (Table 5-2). Aquarion's hydraulic model for the Mill Road wells was utilized to evaluate the impact of GAC treatment on well production. Two head loss scenarios were evaluated 1) 15 psi head loss to represent clean GAC beds and 2) 20 psi head loss to represent potential head loss build-up during operation. The added head loss will result in a production decrease of between 175 and 380 gpm for Wells 6, 9 and 11. Production decreases will range from approximately 30 and 60 gpm for Wells 8A and 20/21. Based on the hydraulic analysis, well replacement pumps were assumed for Wells 6, 9 and 11. If Well 8A, 20, and 21 are treated in the future, replacement of those wells will be re-evaluated.

Table 5-2

Flow rate decrease with GAC treatment

Well No.	Flow Rate Decrease	
	15 psi Head Loss	20 psi Head Loss
6	84	196
9	33	68
11	57	117
8A	18	39
21[1]	8	15
20[1]	9	20

[1] Wells 20 and 21 do not operate concurrently.

Table 5-3 provides the sizing information for the preliminary design. Under Phase 2, the system would be sized to treat all wells but it is assumed that only Wells 6, 9 and 11, at a flow of 1,676 gpm, will be treated based on current PFAS concentrations (operating flow rate). The change out frequency was evaluated at both the maximum operating flow rate (Well 6 for Phase 1 and Wells 6, 9 and 11 for Phase 2) and average annual flow rate. The changeout frequency at maximum operating flow rate represents operation during peak demand season. During non-peak demand, the changeout frequency will be reduced. The pressure vessels could be designed to accept either GAC or IX media. Depending on the treatment target, the number of pressure vessels could be reduced if only IX media is used.

Table 5-3
Preliminary GAC Sizing for Treatment Scenarios

	Phase 1 Well 6	Phase 2 Wells 6, 9, 11
Design flow rate (gpm)	360	2,120
Maximum operating flow rate (gpm)	360	1,676[1]
Annual average flow rate (gpm)	111	550
Vessel operation	Lead/lag	Lead/lag
Number of vessel pairs	1	4
Total number of vessels	2	8
Vessel diameter (ft)	10	10
Media/vessel (lbs)	20,000	20,000
EBCT (min) per vessel at design flow	14.2	9.7
Media size (units)	12x40	12x40
Head loss per lead/lag pair at design flow (psi)	6 psi	10 psi
BV to media changeout for Total PFAS	16,000	16,000
Changeout frequency at maximum operating flow rate (days)[2]	158	34
Changeout frequency at annual average flow rate (days)[3]	513	414
BV to media changeout for MA and CT Regulated PFAS	75,000	75,000
Changeout frequency at maximum operating flow rate (days) [2]	742	636
Changeout frequency at annual average flow rate (days)[3]	2,406	1,943
Backwash storage tank size (gal)	34,000	34,000
Approximate building footprint	50’ x 60'	50' x 90'

[1] Assumes treatment of Wells 6, 9 and 11
[2] Changeout frequency at maximum flow rate represents changeout frequency during high demand periods with the wells operating at design flow rates.
[3] Changeout frequency at annual average flow rate represents changeout frequency averaged out based on historical average operating conditions for the wells.

Table 5-4 presents the anticipated schedule for implementing PFAS treatment for the Mill Rd Wells. It is estimated that design and permitting and construction would require approximately 2 - 3 years to complete.

TABLE 5-4
Anticipated Schedule to Implement PFAS Treatment

Task	Duration
Design	6 – 9 months
Permitting	2 - 12 months
Construction	12 months

Permitting is the largest uncertainty with the implementation schedule. The proposed GAC WTP would be located on Aquarion’s property located off of Mill Rd in North Hampton. North Hampton zoning regulations allow water treatment equipment as a permitted use but a building requires a special exception from the Zoning Board of Adjustment. A new

WTP is currently being constructed on this property. The permitting process for the WTP required over a year to complete. It is anticipated that a similar process may be required for the proposed GAC WTP.

5.3 Point of Entry Concentrations

Table 5-5 and 5-6 present the anticipated POE concentrations for all PFAS with no treatment and the two treatment phases. For the POE calculations under the treatment scenarios, the PFAS concentrations depend on the treated water quality goal. The analysis assumes that the all wells are in operation.

Based on the design concentrations in each well, the no treatment option is able to maintain PFAS concentrations below all current regulatory levels with total PFAS concentrations of 57 ng/L with all wells in operation. Concentrations will be lower when production from the PFAS impacted wells can be reduced. Treatment allows the total PFAS concentration to range from approximately 28 to 50 ng/L when treating Well 6 and less than 4 to 42 ng/L when treating Wells 6, 9 and 11.

Table 5-5

Estimated Point of Entry PFAS Concentrations Based on Maximum Historical PFAS Concentrations and Treatment Targeting Less than the MRL for All PFAS Compounds

	No Treatment[2]	**Phase 1 Well 6[3]**	**Phase 2 Wells 6, 9, 11[3]**
Treated water flow rate (gpm)	0	360	1,676
Untreated flow rate (gpm)	2,120	1,760	444
Combined flow rate (gpm)	**2,120**	**2,120**	**2,120**
Combined PFOA concentration at the POE (ng/L)	**10**	**5**	**<4[1]**
Combined PFOS concentration at the POE (ng/L)	**<4[1]**	**<4[1]**	**<4[1]**
Combined PFHxS concentration at the POE (ng/L)	**<4[1]**	**<4[1]**	**<4[1]**
Combined PFNA concentration at the POE (ng/L)	**<4[1]**	**<4[1]**	**<4[1]**
Combined total PFAS concentration at the POE (ng/L)	**57**	**28**	**<4[1]**

[1] Assumed MRL of 4 ng/L
[2] All wells online for compliance sampling
[3] Assumes treatment of all PFAS

Table 5-6

Estimated Treated and Point of Entry PFAS Concentrations Based on Maximum Historical PFAS Concentrations and Treatment Targeting Less than the MRL for Four NHDES Regulated PFAS Compounds[1]

	No Treatment[3]	Phase 1 Well 6	Phase 2 Wells 6, 9, 11
Treated water flow rate (gpm)	0	360	1,676
Untreated flow rate (gpm)	2,120	1,760	444
Combined flow rate (gpm)	**2,120**	**2,120**	**2,120**
Combined PFOA concentration at the POE (ng/L)	**10**	**5**	**<4[2]**
Combined PFOS concentration at the POE (ng/L)	**<4[2]**	**<4[2]**	**<4[2]**
Combined PFHxS concentration at the POE (ng/L)	**<4[2]**	**<4[2]**	**<4[2]**
Combined PFNA concentration at the POE (ng/L)	**<4[2]**	**<4[2]**	**<4[2]**
Combined total PFAS concentration at the POE (ng/L)	**57**	**50**	**42**

[1] POE concentrations represent the anticipated concentrations prior to media changeout. Concentrations will be lower with virgin GAC after a media changeout

[2] Assumed MRL of 4 ng/L

[3] All wells online for compliance sampling

Section 6
Preliminary Cost Options

Preliminary Opinions of Probable Construction Costs (OPCC) were developed for the two treatment phases based on GAC. The OPCCs are consistent with AACE International Class III cost estimates. Class III costs estimates have a typical expected accuracy range of -20%/+30% and are based on semi-detailed unit costs with a project definition of 10 to 40%. The presented costs are based on the following assumptions:

- Lead/Lag vessel configuration
- Recycling of backwash water with a permanent backwash tank
- Treatment will be housed within a metal building to accommodate the required vessel height clearances.
- The facility will be designed in phases with expansion for treatment of additional wells.
- Treatment facility will be located on the site of the existing garage and will not require storm water management.
- Well pump upgrades required for Wells 6, 9 and 11.
- Cost multipliers
    - General conditions = 15%
    - Contingency = 20%
    - Design Engineering = 12%
    - Construction Phase Engineering = 12%
    - Aquarion Internal Costs = 5%
- Annual O&M costs
    - Labor = $85/hr (burdened rate)
    - Power = $0.11/kWh
    - GAC = $1.75/lb (including disposal)
    - Changeout frequency of 16,000 bed volumes treated for total PFAS < MRL
    - Changeout frequency of 75,000 bed volumes treated for PFOS, PFOA, PFNA, and PFHxS < MRL

Table 6-1 provides OPCC for Phase 1 and Phase 2 for the GAC WTP. Annual O&M costs are driven by the assumed replacement frequencies for the media and depend on the treated water quality goal. Table 6-2 provides a comparison of the anticipated rate impacts of the treatment scenarios. The analysis is based on total revenue requirements and is expressed as a percentage assuming an even distribution of increase across all rates and customers. Rate increases could be reduced if grants or other funding sources are available. Detailed costs are presented in Appendix B.

Table 6-1

Preliminary Opinion of Probable Construction Costs[1]

		Annual O&M	
	OPCC	16,000 Bed Volume Treated Changeout Frequency[2]	75,000 Bed Volume Treated Changeout Frequency[3]
Phase 1 - Well 6	$3,746,000	$101,000	$62,000
Phase 2 - Wells 6, 9, 11	$2,443,000	$342,000	$129,000

[1] OPCC has an expected accuracy of -20%/+30%.

[2] Assumed changeout frequency of 16,000 bed volumes treated in order to target total PFAS concentrations less than the MRL.

[3] Assumed changeout frequency of 75,000 bed volumes treated in order to target PFOA, PFOS, PFNA, and PFHxS concentrations less than the MRL. Concentrations of other PFAS may be measurable.

Table 6-2

Rate Increase Analysis[1, 2]

	16,000 Bed Volume Treated Changeout Frequency	75,000 Bed Volume Treated Changeout Frequency
Phase 1 - Well 6	8%	8%
Phase 2 - Wells 6, 9, 11	16%	13%

[1] Rate increase includes OPCC and annual operations and maintenance costs.

[2] Rate increase is based on the OPCC for GAC treatment, actual rate increase required will depend on final capital and annual O&M costs.

Previous rate impacts presented in the *Mill Road PFAS Treatment Analysis* (Tighe & Bond, 2017) estimated rate impacts ranging between 5% for treating only Well 6 to 16% for treating all wells based on the 16 PFAS evaluated at the time. The update rate impacts are dependent on the assumed GAC media replacement frequency but are similar to the rate impacts from the 2017 evaluation. If treatment targets removal of all PFAS to less than 4 ng/L, the two additional PFAS compounds identified after the 2017 evaluation (i.e., PFBA and PFPeA) will result in more frequent changeouts. More frequent changeouts result in higher annual O&M costs and rate increases. PFBA and PFPeA are not currently regulated and have not been target for regulation by the USEPA or NHDES.

Section 7
Conclusions and Recommendations

PFAS do not currently have a USEPA drinking water maximum contaminant level. Two PFAS (PFOA and PFOS) have a USEPA Health Advisory Level. NH has recently adopted MCLs for 4 PFAS (i.e., PFOA, PFOS, PFHxS, and PFNA). PFAS have been detected in several of Aquarion's Mill Road wells. PFOA is the only PFAS that has been detected above an MCL and that is only in Well 6.

Based on the most recent PFAS concentrations in the well water, it is estimated that current operations with no treatment will keep all of the regulated PFAS to less than 10 ng/L and total PFAS concentration in the water from the Mill Road Wellfield to below 57 ng/L (Table 7-1). Compliance with the regulations is based on the PFAS concentration in water samples collected at the entry point to the distribution system, as opposed to samples collected at individual wells. All wells are required to be online during sampling. The wellfield operating strategy will limit Well 6 operation during normal operation to only when it is needed to meet demand or for compliance sampling.

To decrease PFAS concentrations further, treatment of the well water will be necessary. Aquarion conducted bench and pilot-scale testing to evaluate the performance of GAC and IX to remove the PFAS compounds present in the Mill Rd wellfield. The results of the testing indicate:

- GAC and IX were able to remove all PFAS compounds to <4 ng/L.
- Unregulated shorter chain perfluorinated carboxylic acids (PFBA and PFPeA) were the first compounds to breakthrough treatment. GAC was more effective for removing the shorter chain compounds.
- IX was more effective (i.e., higher capacity) than GAC for removing the regulated PFAS.
- GAC or IX replacement frequency will be dependent on the target treated water quality goal.
- GAC was selected for developing preliminary costs estimates. IX can be considered if current or future resins can provide a lower life cycle cost.

A preliminary design was developed to refine PFAS treatment costs. GAC was the evaluated treatment technology but the system would be flexible to be converted to IX. The preliminary design assumed a phased construction approach. The first phase would treat only Well 6 with the flexibility to expand to treat all Mill Rd wells. It was assumed that only Wells 6, 9 and 11 would be treated under the expansion but flexible piping configurations were assumed to allow treatment of Wells 8A, 20, and 21, if required.

- Treating just the water from Well 6 (Treatment Phase 1) is estimated to reduce total PFAS concentrations in the water leaving the Mill Road Wellfield to between approximately 28 and 50 ng/L depending on the treated water quality goal for changing out the GAC media. This scenario is estimated to require a rate increase of approximately 8% because of the need to construct a treatment facility and increases in annual O&M costs.

- Treating the water from Well 6, 9, and 11 (Treatment Phase 2) is estimated to reduce total PFAS concentrations in the water leaving the Mill Road Wellfield to less than 4 ng/L to 42 ng/L depending on the treated water quality goal for changing out the GAC media. This scenario is estimated to result in a rate increase of approximately 13 - 16% because of the need to construct a larger treatment facility and more significant annual O&M costs.

The data and costs presented are based on 2019 costs, PFAS concentrations, historical wellfield operation, and regulations. Actual costs may vary depending on changes to PFAS concentrations, regulations, costs, and operational changes.

Previous rate impacts presented in the Mill Road PFAS Treatment Analysis (Tighe & Bond, 2017) estimated rate impacts ranging between 5% for treating only Well 6 to 16% for treating all wells based on the 16 PFAS evaluated at the time. The update rate impacts are dependent on the assumed GAC media replacement frequency but are similar to the rate impacts from the 2017 evaluation. If treatment targets removal of all PFAS to less than 4 ng/L, the two additional PFAS compounds identified after the 2017 evaluation (i.e., PFBA and PFPeA) will result in more frequent changeouts. More frequent changeouts result in higher annual O&M costs and rate increases. PFBA and PFPeA are not currently regulated and have not been target for regulation by the USEPA or NHDES.

GAC media replacement is the primary driver for the estimated annual O&M costs. The replacement frequency will depend on the treated water quality goal. The first PFAS compounds to break through GAC are PFBA and PFPeA, which are four and five chain PFAS compounds. These compounds are not currently regulated by the USEPA or NHDES and potential future regulations related to these compounds are uncertain. GAC replacement frequency would be less frequent if replacement is based on breakthrough of the four PFAS compounds regulated in NH as compared to treating all PFAS compounds to less than the MRL.

Aquarion is actively monitoring PFAS concentrations in all of its wells. PFAS encompass a broad range of compounds and health effect information for these compounds is continuing to evolve. As PFAS regulations change, Aquarion will continue to evaluate the effects on drinking water. Aquarion is committed to working with the communities affected by PFAS to ensure that the appropriate steps are taken to reduce exposure in drinking water.

Table 7-1

Summary of Estimated PFAS Concentrations in Water Entering the Distribution System from Mill Road Wells and Preliminary Costs Based on GAC Treatment

	No Treatment	Treatment Phase 1 Well 6		Treatment Phase 2 Wells 6, 9, 11	
	All Wells Online[5]	16,000 Bed Volume Treated Changeout Frequency[6]	75,000 Bed Volume Treated Changeout Frequency[7]	16,000 Bed Volume Treated Changeout Frequency[6]	75,000 Bed Volume Treated Changeout Frequency[7]
Treated water flow rate (gpm)	0	360	360	1,676	1,676
Combined PFOA concentration at the POE (ng/L)	10	5	5	<4[1]	<4[2]
Combined PFOS concentration at the POE (ng/L)	<4[2]	<4	<4[2]	<4[1]	<4[2]
Combined PFHxS concentration at the POE (ng/L)	<4[2]	<4	<4[2]	<4[1]	<4[2]
Combined PFNA concentration at the POE (ng/L)	<4[2]	<4	<4[2]	<4[1]	<4[2]
Total PFAS concentration entering the distribution system (ng/L)[1]	57	28	50	<4[1]	42
Opinion of Probable Construction Costs (OPCC)[3]	$0M	$4.1M		$2.6M ($6.7M total for Phase 1 and 2)	
Preliminary annual O&M costs	$0M	$0.1M	$0.1M	$0.3M	$0.1M
Rate increase required[4]	0%	8%	8%	16%	13%

[1] Based on historical maximum concentration of PFAS in well waters in 2017-2019.
[2] Method Reporting Limit (MRL) assumed to be 4 ng/L. MRL is the lowest concentration that can be reported with a reasonable degree of accuracy and precision.
[3] OPCC have an expected accuracy of -20%/+30%.
[4] Rate increase is based on the preliminary OPCC and annual O&M costs for GAC treatment, actual rate increase required will depend on final capital and annual O&M costs.
[5] All wells online during high demand periods and for regulatory compliance sampling.
[6] Assumed changeout frequency of 16,000 bed volumes treated in order to target total PFAS concentrations less than the MRL.
[7] Assumed changeout frequency of 75,000 bed volumes treated in order to target PFOA, PFOS, PFNA, and PFHxS concentrations less than the MRL. Concentrations of other PFAS may be measurable.

Section 8
References

Campos, J., Boodoo, F., Kennedy, S, Begg, E. 2017. Advances in Ion Exchange Treatment for PFAS. AWWA Annual Conference and Exposition. Pittsburgh, PA. June 11-14.

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Tighe & Bond. 2017. Mill Road PFAS Treatment Analysis.

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APPENDIX A
Preliminary Design Drawings

MILL ROAD PFAS WATER TREATMENT PLANT
NORTH HAMPTON, NEW HAMPSHIRE

AQUARION WATER COMPANY OF NEW HAMPSHIRE
HAMPTON, NEW HAMPSHIRE

JULY 2018

LIST OF DRAWINGS	
SHEET NO.	SHEET TITLE
G-1	COVER
C-1	SITE PLAN - 1
C-2	SITE PLAN - 2
M-1	MECHANICAL FLOOR PLAN
A-1	ARCHITECTURAL ELEVATIONS
PI-1	PROCESS AND INSTRUMENTATION DIAGRAM

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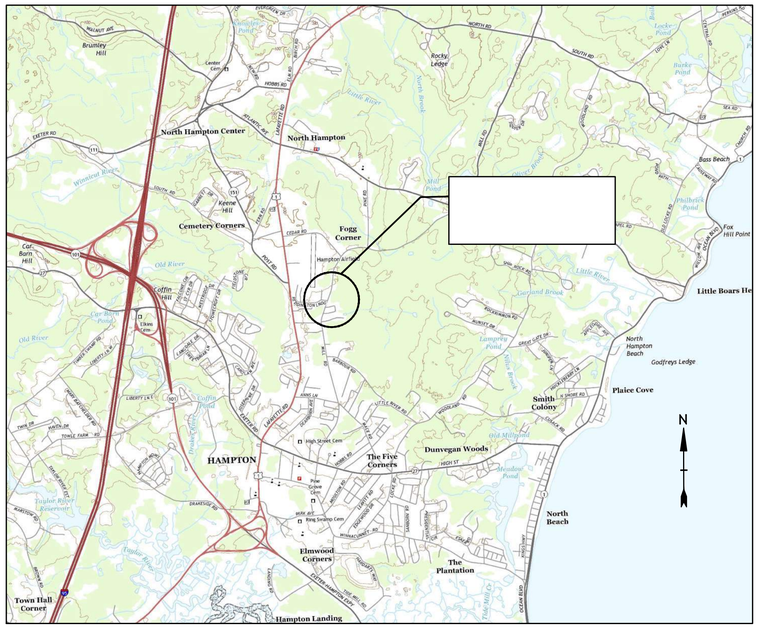


LOCATION MAP

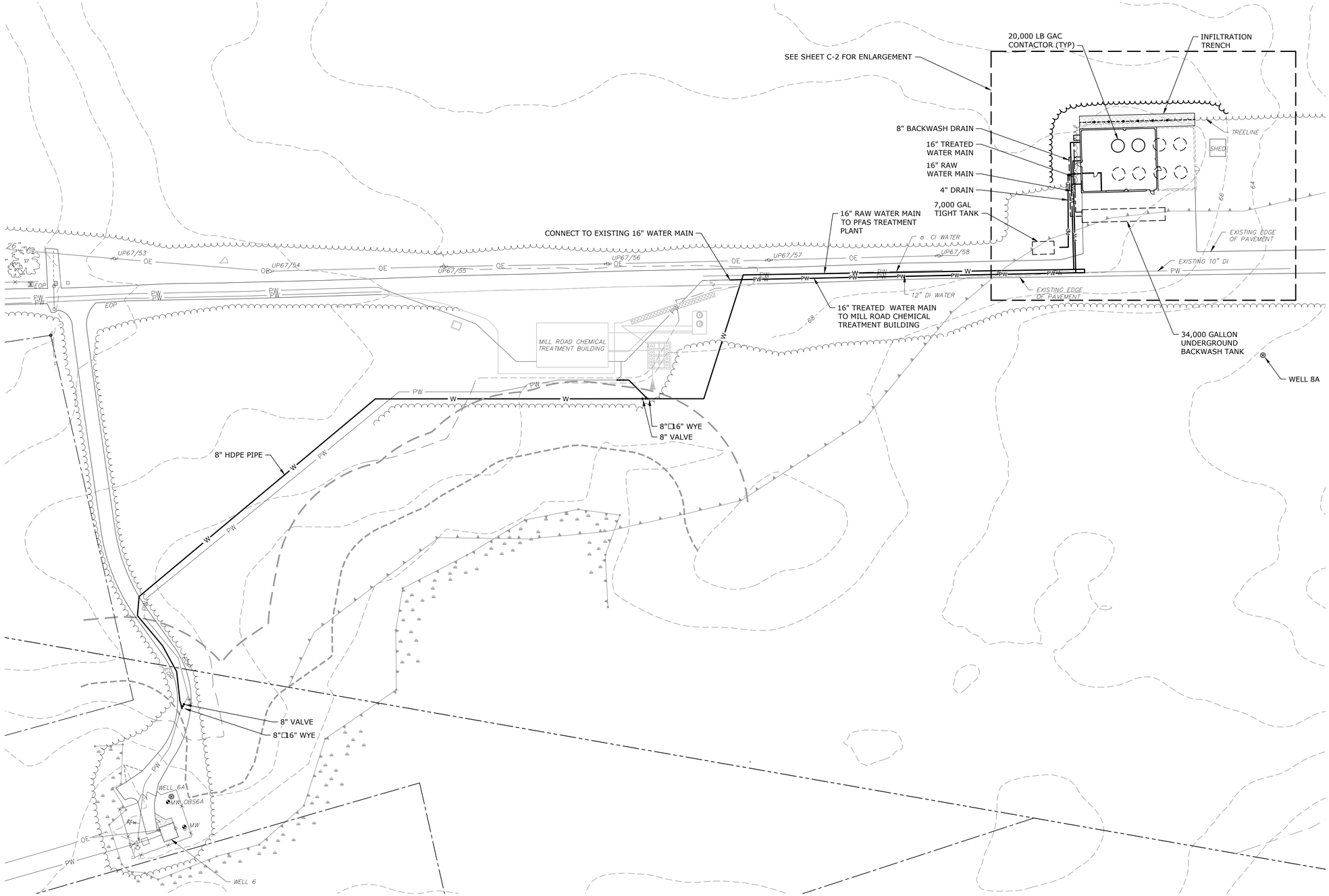
SCALE IN FEET
0 3000' 6000'
GRAPHIC SCALE

PREPARED BY:
Tighe&Bond
www.tighebond.com

CLIENT:
AQUARION WATER COMPANY OF NEW HAMPSHIRE

LOCATION:
NORTH HAMPTON, NEW HAMPSHIRE

COMPLETE SET 6 SHEETS



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Aquarion Water Company of New Hampshire

Mill Road PFAS Water Treatment Plant

North Hampton, New Hampshire

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APPROVED:	JRC

SITE PLAN - 1

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C-1

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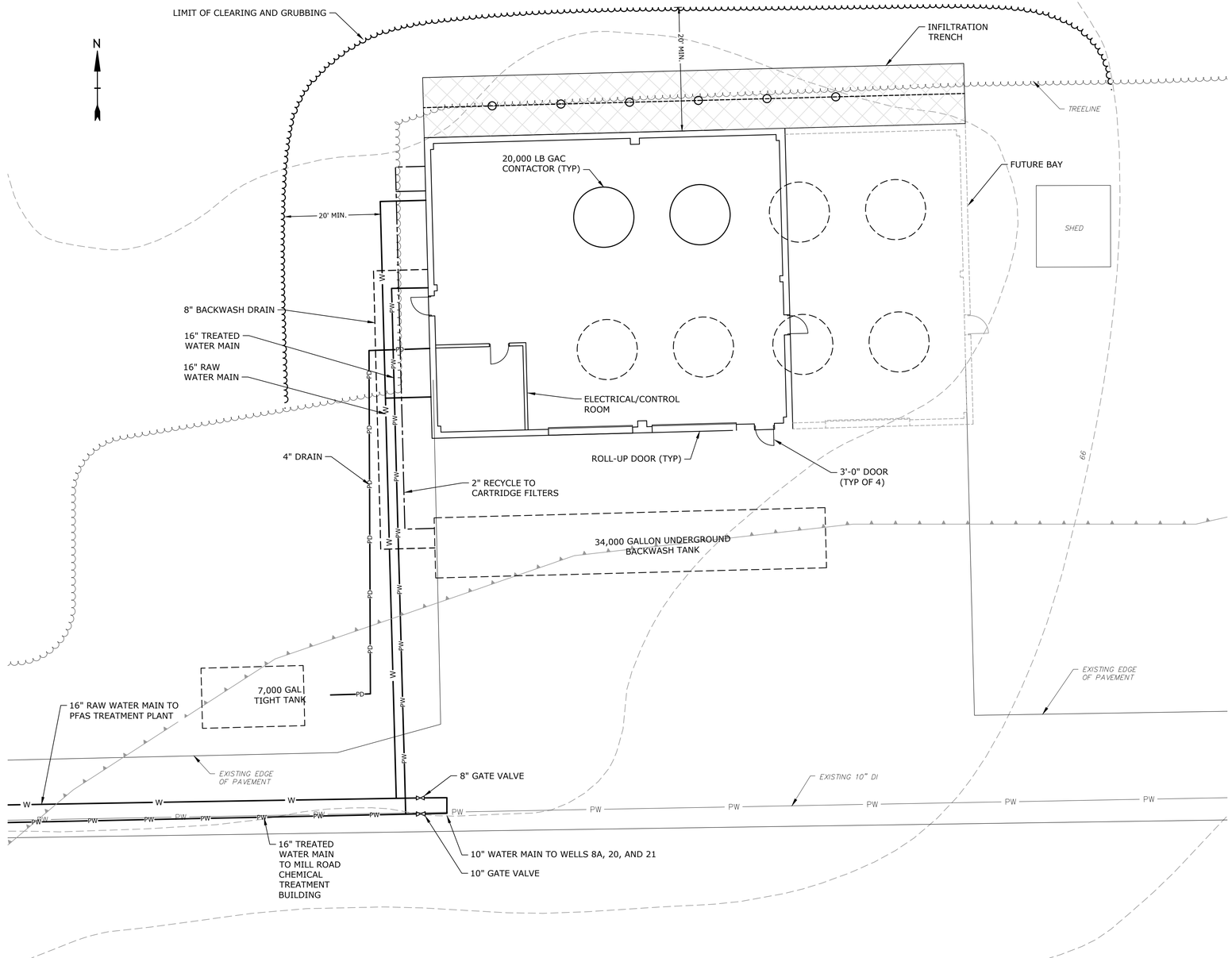

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Aquarion Water Company of New Hampshire

Mill Road PFAS Water Treatment Plant

North Hampton, New Hampshire

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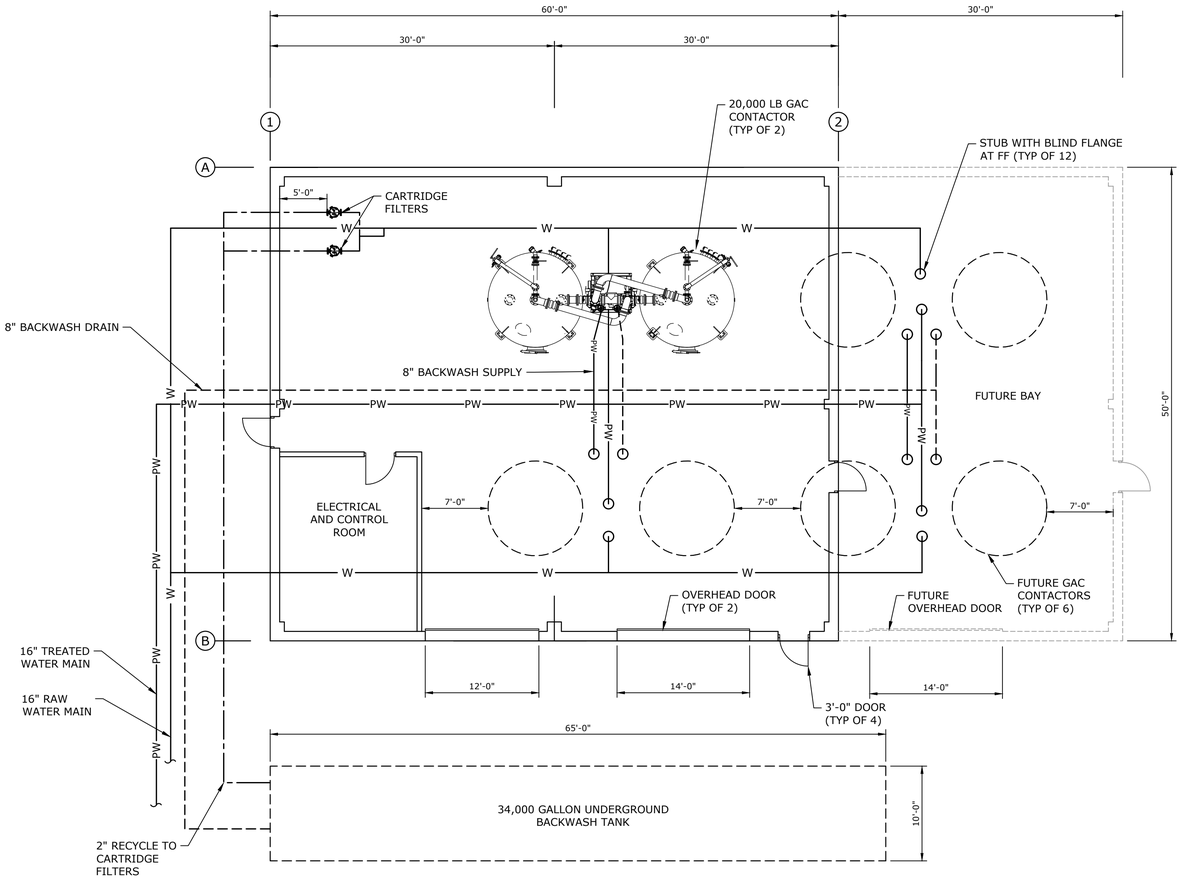
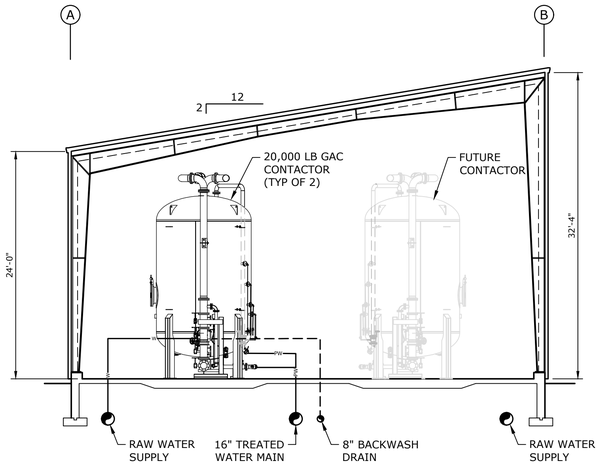
C-2





Tighe&Bond
Engineers | Environmental Specialists

Aquarion Water Company of New Hampshire

Mill Road PFAS Water Treatment Plant

North Hampton,
New Hampshire

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MECHJANICAL FLOOR PLAN

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M-1

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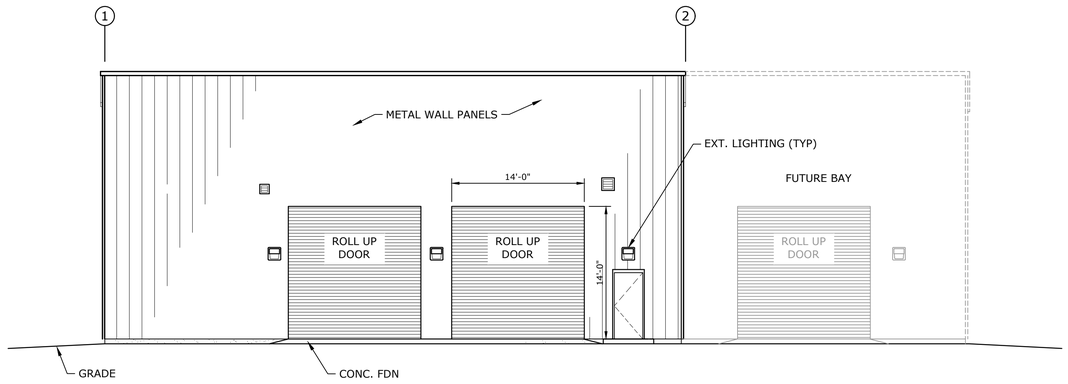

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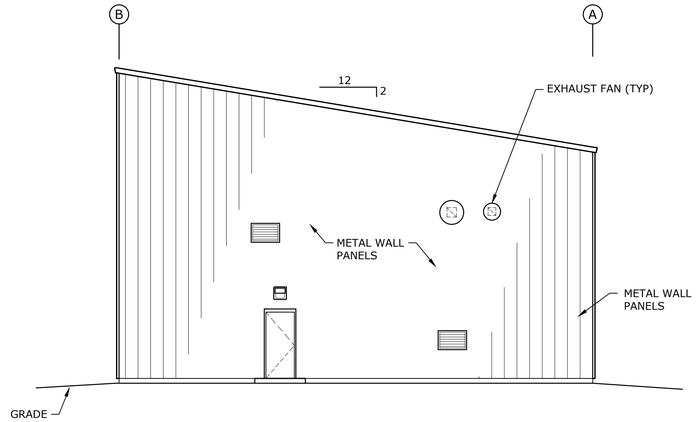

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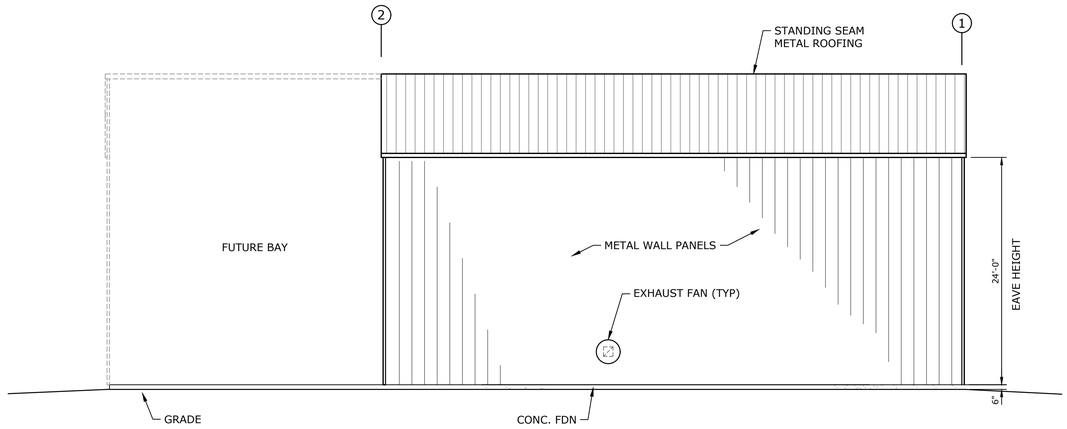

NORTH ELEVATION
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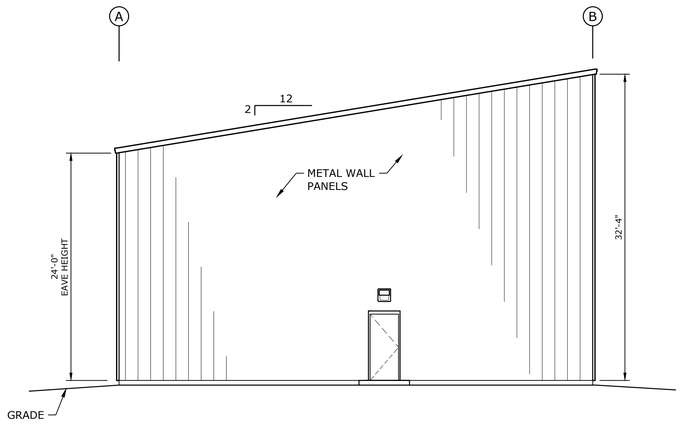

WEST ELEVATION
1/8"=1'-0"

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Mill Road PFAS Water Treatment Plant

North Hampton, New Hampshire

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CHECKED:	HRB
APPROVED:	JRC

ARCHITECTURAL ELEVATIONS

SCALE: 1/8"=1'-0"

A-1

Last Saved: 6/15/2018
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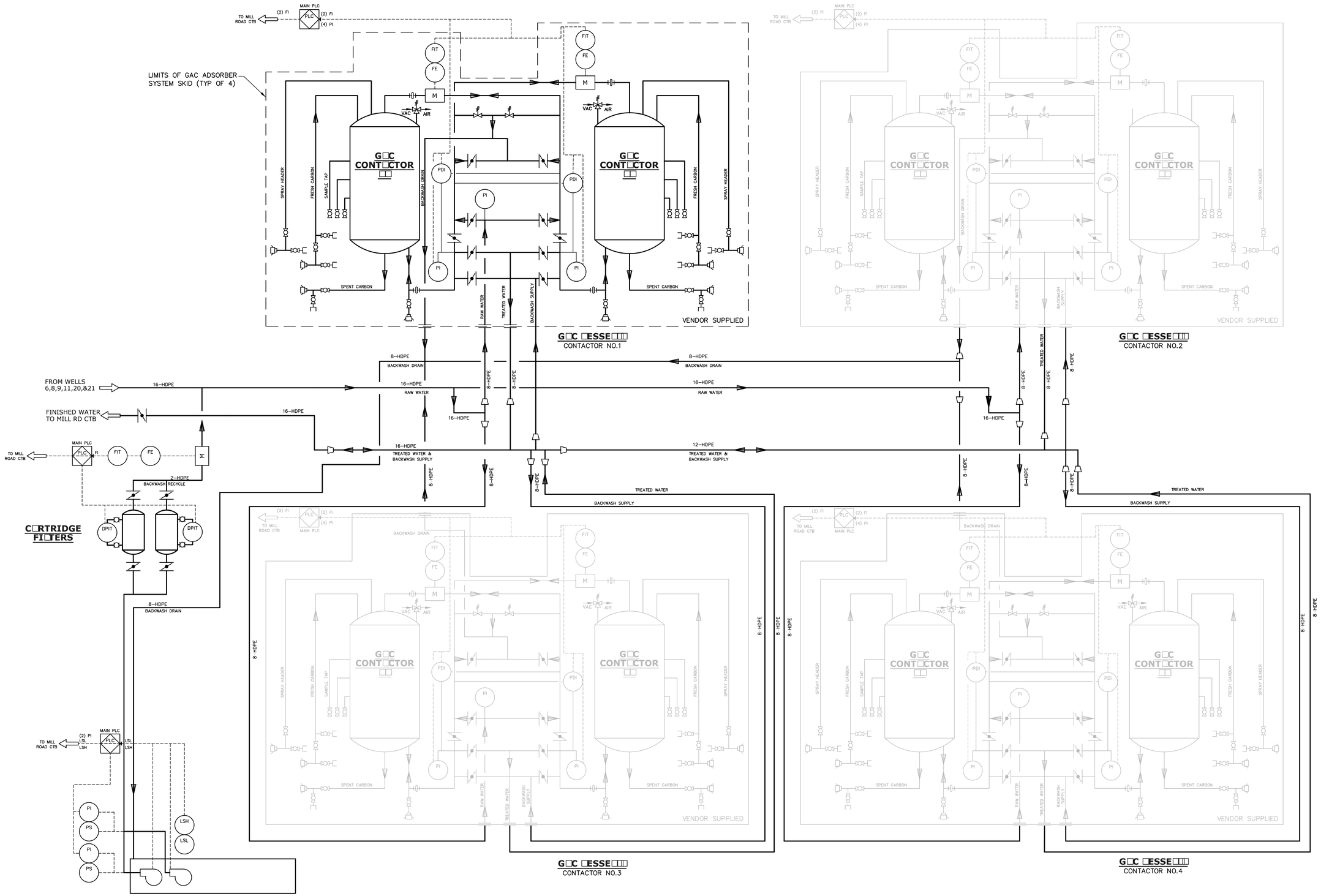

Tighe&Bond
Engineers | Environmental Specialists

PRELIMINARY
NOT FOR CONSTRUCTION

Aquarion Water Company of New Hampshire

Mill Road PFAS Water Treatment Plant

North Hampton, New Hampshire

VERIFY SCALE
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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

PROJECT NO:	A1000/83C
DATE:	07/03/2018
FILE:	A1000-83-PID.dwg
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CHECKED:	HRB
APPROVED:	JRC

PROCESS DIAGRAM

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Last Saved: 7/3/2018 By: HRB
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APPENDIX B
Preliminary Capital and Annual O&M Costs Estimates

Tighe&Bond

MILL ROAD PFAS TREATMENT PLANT
NORTH HAMPTON, NEW HAMPSHIRE
North Hampton, New Hampshire

OPINION OF PROBABLE CONSTRUCTION COST - Phase 1 Well 6

AQUARION WATER COMPANY OF NEW HAMPSHIRE

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	INSTALLATION	TOTAL
1.	**Treatment Plant Building**						**$566,219**
	Demolish Existing Garage	LS	1	$51,094	$51,094	N/A	$51,094
	Building Structure	SF	3000	$56	$165,000	N/A	$165,000
	Building Foundation	LS	1	$229,924	$225,000	N/A	$225,000
	Overhead Door	EA	2	$10,219	$20,000	N/A	$20,000
	Man Doors	EA	3	$3,066	$9,000	N/A	$9,000
	Electrical Room Walls and Ceiling	LS	1	$20,438	$20,000	N/A	$20,000
	Concrete Encasement for Piping Below Building	CY	76	$1,022	$76,125	N/A	$76,125
2.	**Site Work**						**$760,693**
	Backwash Tank (34,000 Gal Concrete Tank)	CY	90	$1,124	$101,167	N/A	$101,167
	16-inch Raw Water Piping	LF	550	$153	$84,305	N/A	$84,305
	16-inch Treated Water Main to Mill Rd WTP	LF	400	$153	$61,313	N/A	$61,313
	8-inch Raw Water Piping from Well 6	LF	550	$128	$70,255	N/A	$70,255
	Tight Tank (7,000 Gal)	EA	1	$13,284	$13,284	$5,314	$18,598
	8-inch Drain Piping to Tight Tank	LF	175	$82	$14,306	N/A	$14,306
	8-inch Drain 90 Degree Bend - PVC	EA	6	$230	$1,380	N/A	$1,380
	8-inch Drain 4-inch Tee - PVC	EA	1	$255	$255	N/A	$255
	8-inch Drain 4-inch Cross - PVC	EA	1	$255	$255	N/A	$255
	8-inch Backwash Piping to Backwash Tank	LF	50	$128	$6,387	N/A	$6,387
	Infiltration Trench - 3/4" Crushed Stone	CY	133	$49	$6,540	N/A	$6,540
	18-inch Perforated PVC Pipe	LF	90	$164	$14,715	N/A	$14,715
	4-inch Risers	EA	6	$102	$613	N/A	$613
	8x8x8 Wye - Process Piping	EA	1	$2,044	$2,044	N/A	$2,044
	8x16x16 Wye - Process Piping	EA	1	$2,555	$2,555	N/A	$2,555
	8" Gate Valve - Process Piping	EA	2	$1,226	$2,453	N/A	$2,453
	16" Gate Valve - Process Piping	EA	4	$2,555	$10,219	N/A	$10,219
	22 Degree Bend - 8-inch - Process Piping	EA	4	$511	$2,044	N/A	$2,044
	45 Degree Bend - 16-inch - Process Piping	EA	3	$2,555	$7,664	N/A	$7,664
	45 Degree Bend - 8-inch - Process Piping	EA	3	$511	$1,533	N/A	$1,533
	90 Degree Bend - 16-inch - Process Piping	EA	2	$2,350	$4,701	N/A	$4,701
	90 Degree Bend - 8-inch - Process Piping	EA	2	$511	$1,022	N/A	$1,022
	16x16x10 Tee - Process Piping	EA	2	$1,942	$3,883	N/A	$3,883
	10x10x10 Tee - Process Piping	EA	1	$1,022	$1,022	N/A	$1,022
	16x16x16 Tee - Process Piping	EA	1	$2,963	$2,963	N/A	$2,963
	2" PVC Domestic Water Piping	LF	1150	$77	$88,138	N/A	$88,138
	2" Backflow Preventer - Domestic Water Piping	EA	1	$920	$920	N/A	$920
	Trench Repair - Permanent	SY	640	$59	$37,932	N/A	$37,932
	Trench Repair - Temporary	SY	640	$23	$14,715	N/A	$14,715
	Communication Conduit (2 Conduits)	LF	1200	$46	$55,182	$18	$55,200
	Electrical Conduit (2 Conduits)	LF	1200	$46	$55,182	$18	$55,200
	Gas Pipeline from WTP to PFAS Treatment Plant	LF	500	$123	$61,313	$48	$61,361
	Site Clearing	SF	3500	$7	$25,036	N/A	$25,036

Tighe&Bond

MILL ROAD PFAS TREATMENT PLANT
NORTH HAMPTON, NEW HAMPSHIRE
North Hampton, New Hampshire

OPINION OF PROBABLE CONSTRUCTION COST - Phase 1 Well 6

AQUARION WATER COMPANY OF NEW HAMPSHIRE

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	INSTALLATION	TOTAL
3.	**Mechanical**						**$550,835**
	GAC Contactor Pairs	EA	1	$303,500	$303,500	$59,400	$362,900
	Cartridge Filters	EA	2	$1,967	$3,934	$770	$4,704
	2-inch Cartridge Filter Piping	LF	140	$102	$14,306	$40	$14,346
	2-inch Pressure Gauges - Cartridge Filters	EA	4	$102	$409	$40	$449
	2-inch Flow Meter - Cartridge Filters	EA	1	$2,044	$2,044	$800	$2,844
	2-inch 90-Degree Bends - Cartridge Filters	EA	9	$153	$1,380	$60	$1,440
	2-inch Tee - Cartridge Filters	EA	2	$153	$307	$60	$367
	2-inch Connection to RW Main	EA	1	$307	$307	$120	$427
	Tank Level Sensors	EA	2	$1,022	$2,044	$400	$2,444
	16-inch Raw Water Piping	LF	155	$153	$23,759	N/A	$23,759
	16-inch Treated Water Piping	LF	100	$153	$15,328	N/A	$15,328
	8-inch Drain Piping	LF	100	$102	$10,219	N/A	$10,219
	8-inch Treated Water Piping	LF	30	$102	$3,066	N/A	$3,066
	8-inch Raw Water Piping	LF	30	$102	$3,066	N/A	$3,066
	8-inch Drain Piping to Tight Tank	LF	95	$102	$9,708	N/A	$9,708
	8-inch Flow Meters	EA	2	$4,496	$8,993	$3,597	$12,590
	Backwash Tank Recirculation Pumps	EA	1	$10,219	$10,219	N/A	$10,219
	Well 6 Submersible Pump with VFD	EA	1	$35,766	$35,766	N/A	$35,766
	90 Degree Bend - 8-inch - Process Piping	EA	18	$511	$9,197	N/A	$9,197
	90 Degree Bend - 16x8 - Process Piping	EA	2	$1,022	$2,044	N/A	$2,044
	8x8x8 Tee - Process Piping	EA	1	$1,124	$1,124	N/A	$1,124
	16x16x8 Tee - Process Piping	EA	2	$1,533	$3,066	N/A	$3,066
	16x8x16x8 Cross - Process Piping	EA	3	$3,168	$9,504	N/A	$9,504
	8x8x8x8 Cross - Process Piping	EA	1	$2,657	$2,657	N/A	$2,657
	16x8x8 Tee - Process Piping	EA	1	$2,248	$2,248	N/A	$2,248
	8-inch Blind Flange	EA	12	$613	$7,358	N/A	$7,358
4.	**HVAC**						**$62,948**
	Tank Insulation	LS	1	$16,861	$16,861	$6,744	$23,606
	Wall/Roof Exhaust and Louver	LS	1	$4,496	$4,496	$1,799	$6,295
	60 MBH Unit Heaters and Gas Piping and Gas Meter	LS	1	$13,489	$13,489	$5,396	$18,884
	Low Voltage Wiring and tstat Work	LS	1	$10,117	$10,117	$4,047	$14,163
5.	**Electrical**						**$144,213**
	Lighting	LS	1	$5,109	$5,109	N/A	$5,109
	Conduit & Wire	LS	1	$85,838	$85,838	N/A	$85,838
	Electrical Distribution Equipment	LS	1	$28,741	$28,741	N/A	$28,741
	Fire Alarm & Security	LS	1	$8,686	$8,686	N/A	$8,686
	Control Panels	LS	1	$3,066	$3,066	N/A	$3,066
	Misc. Electrical	LS	1	$12,774	$12,774	N/A	$12,774
					SUBTOTAL		**$2,084,909**
11.	**General Conditions - 15%**						$312,736
					CONSTRUCTION - SUBTOTAL		**$2,397,646**
12.	**Contingency - 20%**						$479,529
					Total Construction Cost		**$2,877,175**
13.	Design Engineering Services (12%)						$345,261
14.	Construction Phase Engineering Services (12%)						$345,261
					Construction and Design Subtotal		**$3,567,697**
15.	Aquarion Internal Costs (5%)						$178,385
					Total Project Cost		**$3,746,081**
					SAY		**$3,746,000**

This is an engineer's Opinion of probable Construction Cost (OPCC). Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the opinion of probable construction costs are made on the basis of the Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this opinion of the Probable Construction Cost.

Tighe&Bond

MILL ROAD PFAS TREATMENT PLANT
NORTH HAMPTON, NEW HAMPSHIRE
North Hampton, New Hampshire

OPINION OF PROBABLE CONSTRUCTION COST - Phase 1 Well 6

AQUARION WATER COMPANY OF NEW HAMPSHIRE

					Total PFAS < MRL		4 Regulated PFAS <MRL	
					16,000 BV to Changeout		75,000 BV to Changeout	
O&M Category	**Item Description**	**Units**	**Unit Cost**		**Quantity**	**Total Cost**	**Quantity**	**Total Cost**
Energy								
	Electricity	kWh	$	0.11	7700	$ 847	7700	$ 847
Media								
	GAC Media (Annual Ave Flow)	lb	$	1.75	14,221	$ 24,886	3,827	$ 6,697
Consumables								
	Cartridge Filters	EA	$	10	6	$ 59.10	6	$ 59.10
Analytical								
	Treatment Performance and Compliance Monitoring	$/sample	$	215	72	$ 15,480	24	$ 5,160
Labor								
	Treatment Plant Operator	Hours	$	85	370	$ 31,450	240	$ 20,400
Replacement Parts (1% of Capital Cost)								
	Replacement Part	LS	1% of Capital		1	$ 28,772	1	$ 28,772
	GRAND TOTAL ANNUAL O&M					**$ 101,000**		**$ 62,000**

Tighe&Bond

MILL ROAD PFAS TREATMENT PLANT
NORTH HAMPTON, NEW HAMPSHIRE
North Hampton, New Hampshire

OPINION OF PROBABLE CONSTRUCTION COST - Phase 2 Wells 6, 9, and 11

AQUARION WATER COMPANY OF NEW HAMPSHIRE

ITEM	DESCRIPTION	UNITS	QTY	UNIT PRICE	SUB TOTAL	INSTALLATION	TOTAL
1.	**Treatment Plant Building**						**$100,656**
	Building Structure	SF	1500	$56	$84,305	N/A	$84,305
	Overhead Door	EA	1	$10,219	$10,219	N/A	$10,219
	Man Doors	EA	2	$3,066	$6,131	N/A	$6,131
2.	**Site Work**						**$0**
3.	**Mechanical**						**$1,107,813**
	GAC Contactor Pairs	EA	3	$303,500	$910,499	$59,400	$969,899
	8-inch Drain Piping	LF	60	$102	$6,131	N/A	$6,131
	8-inch Treated Water Piping	LF	60	$102	$6,131	N/A	$6,131
	8-inch Raw Water Piping	LF	60	$102	$6,131	N/A	$6,131
	8-inch Flow Meters	EA	6	$4,496	$26,978	$10,791	$37,769
	Well 9, 11 Submersible Pump with VFD	EA	2	$37,810	$75,619	N/A	$75,619
	90 Degree Bend - 8-inch - Process Piping	EA	12	$511	$6,131	N/A	$6,131
4.	**HVAC**						**$110,159**
	Tank Insulation	LS	1	$50,583	$50,583	$20,233	$70,817
	Wall/Roof Exhaust and Louver	LS	1	$4,496	$4,496	$1,799	$6,295
	60 MBH Unit Heaters and Gas Piping and Gas Meter	LS	1	$13,489	$13,489	$5,396	$18,884
	Low Voltage Wiring and tstat Work	LS	1	$10,117	$10,117	$4,047	$14,163
5.	**Electrical**						**$40,875**
	Lighting	LS	1	$5,109	$5,109	N/A	$5,109
	Conduit & Wire	LS	1	$20,438	$20,438	N/A	$20,438
	Fire Alarm & Security	LS	1	$5,109	$5,109	N/A	$5,109
	Misc. Electrical	LS	1	$10,219	$10,219	N/A	$10,219
					SUBTOTAL		**$1,359,503**
11.	**General Conditions - 15%**						$203,925
					CONSTRUCTION - SUBTOTAL		**$1,563,428**
12.	**Contingency - 20%**						$312,686
					Total Construction Cost		**$1,876,114**
13.	Design Engineering Services (12%)						$225,134
14.	Construction Phase Engineering Services (12%)						$225,134
					Construction and Design Subtotal		**$2,326,381**
15.	Aquarion Internal Costs (5%)						$116,319
					Total Project Cost		**$2,442,700**
					SAY		**$2,443,000**

This is an engineer's Opinion of probable Construction Cost (OPCC). Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the opinion of probable construction costs are made on the basis of the Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this opinion of the Probable Construction Cost.

Tighe&Bond

MILL ROAD PFAS TREATMENT PLANT
NORTH HAMPTON, NEW HAMPSHIRE
North Hampton, New Hampshire

OPINION OF PROBABLE CONSTRUCTION COST - Phase 2 Wells 6, 9, and 11

AQUARION WATER COMPANY OF NEW HAMPSHIRE

					Total PFAS < MRL		4 Regulated PFAS <MRL	
					16,000 BV to Changeout		75,000 BV to Changeout	
O&M Category	Item Description	Units	Unit Cost		Quantity	Total Cost	Quantity	Total Cost
Energy								
	Electricity	kWh	$	0.11	110,000	$ 12,100	110,000	$ 12,100
Media								
	GAC Media	lb	$	1.75	70,463	$ 123,311	15,032	$ 26,306
Consumables								
	Cartridge Filters	EA	$	10	6	$ 59.10	6	$ 59.10
Analytical								
	Treatment Performance and Compliance Monitoring	$/sample	$	215	504	$ 108,360	84	$ 18,060
Labor								
	Treatment Plant Operator	Hours	$	85	590	$ 50,150	290	$ 24,650
Replacement Parts (1% of Capital Cost)								
	Replacement Part	LS	1% of Capital		1	$ 47,533	1	$ 47,533
	GRAND TOTAL ANNUAL O&M					**$ 342,000**		**$ 129,000**

Public Water System Consolidation Study Initiative

Proposal to the Drinking Water and Groundwater Advisory Commission

New Hampshire Department of Environmental Services

Funds Requested from the NH Drinking Water & Groundwater Trust Fund

- $200,000 (up to 20 projects at up to $10,000 each)
- The N.H. Dept. of Environmental Services ("NHDES") will administer this program on behalf of the N.H. Drinking Water and Groundwater Advisory Commission ("Commission") in the manner provided herein.
- NHDES is requesting the Commission award this funding to NHDES under the category of "NHDES Projects in Accordance with RSA 485-F:3,I" (2020 Award Plan, Section 5.C).
- Upon approval by the Commission, if granted, NHDES will prepare an Accept and Expend request for review and approval by the Governor and Executive Council and Legislative Fiscal Committee.

Problem Statement / Purpose

In light of the following challenges facing small community water systems (CWS) and non-transient, non-community (NTNC) water systems in New Hampshire, the purpose of this initiative is to provide a source of funding for these small water systems to evaluate the cost-effectiveness of connecting to a larger, more viable community water system.

1. New standards for PFAS, arsenic, 1,4-dioxane, and manganese will impact a large number of small CWS and NTNC water systems.
2. Installing treatment systems for small CWS and NTNC water systems is technically and financially challenging:
    a) Small CWS and NTNC water systems have a limited number of customers to finance both capital and operating and maintenance costs;
    b) Small CWS and NTNC water systems often have volunteer "managers" and contract operators that visit monthly, and lack the daily technical staff oversight capacity to operate and maintain treatment systems;
    c) Long-term compliance with the new water quality standards will be difficult to maintain due to the technical, managerial, and financial limitations associated with many small CWS and NTNC water systems.
3. Small CWS and NTNC water systems generally default to installing treatment to address water quality violations as they generally do not have access to engineering firms to study alternative options and their associated long-term costs such as interconnecting to a nearby larger community water system.
4. Small CWS and NTNC water systems disproportionately require financial assistance and grants from the federal and state government relying on financial assistance programs that are not self-sustaining.

5. Administering and ensuring compliance with the Safe Drinking Water Act for small CWS and NTNC water systems requires a disproportionate number of resources, especially staff time, from NHDES.
6. Larger community water systems have better financial, managerial, and technical capacity to respond to new regulatory requirements than small CWS and NTNC water systems.
7. Large community water systems generally have the engineering and financial planning capacity to operate in a sustainable manner in the face of a changing regulatory environment.

Proposed Use of Funds

- A reimbursement program for small CWS and NTNC water systems to hire an engineering consultant of their choice to perform a cost-effective evaluation comparing interconnecting to a larger community water system versus treating their own sources.
- The evaluation will include both capital and annual operation and maintenance costs to compare the lifecycle costs of the alternatives.
- The eligible cost will be capped (see "Eligibility" below).

Based on NHDES's experience, interconnecting to a larger water system will be cost effective for a high percentage of small CWS and NTNC water systems compared to treating their existing sources. We believe that once the owners of these systems are presented with realistic estimates of the costs, they will be more likely to connect, thereby mitigating the challenges outlined above. This program may be leveraged with other ongoing or proposed initiatives such as construction of water main extensions of existing large community water systems.

Eligibility

Eligible applicants include:

- Community Water Systems (CWS) serving up to a 1,000 population.
- Non-transient, non-community (NTNC) water systems owned by not-for-profit organizations (for example, public schools).
- Must have source(s) exceeding a drinking water maximum contaminant level (MCL) prior to treatment or a documented water supply shortage that can be addressed by interconnecting to a larger, more viable CWS.

Eligible costs include:

- An engineering cost-effective evaluation comparing interconnecting to a larger community water system versus treating a system's own sources. The evaluation will include both capital and annual operation and maintenance costs to compare the lifecycle costs of the alternatives.
- As a condition of funding, the consultant will be required to review and update the water system's Water Business Plan or Asset Management Plan, if one exists, or prepare a Water Business Plan in accordance with NHDES guidance. Review, update and/or preparation of the Water Business Plan will be an eligible expense.
- The amount per award will be capped at $10,000 per eligible water system.

NHDES Funding Administration

1. NHDES administration of the program will use the Emergency Drought Assistance Program as a model.
2. NHDES will announce the program publicly and solicit applications from eligible public water systems with identified need.
3. Water systems will apply directly to NHDES.
4. NHDES will review applications and select projects for funding in accordance with the eligibility criteria. Eligible projects will be awarded on a first-come, first-served basis until the approved funding is exhausted.
5. Recipients will request reimbursement from NHDES for eligible expenses. NHDES will require invoices and other backup documentation necessary to substantiate the reimbursement requests.
6. Funding will be provided to the public water system as a reimbursement using NHDES Class 300 funds.
7. No match will be required from the recipient.

Effective Date: upon approval by the Commission.

Sunset Date: The program will continue until the approved funding is exhausted. If the program is successful, NHDES may request additional funding from the Commission to expand and continue it.

Waiver: The Commission, in its discretion, may waive any of these provisions if granting the waiver will result in circumstances that better fulfill the purpose and intent of the initiative described above or if strict adherence to the provision being waived would not be in the best interest of the public, the environment, or the Drinking Water and Groundwater Trust Fund program. The Commission may designate a Subcommittee to approve or deny waivers on their behalf.

NEW HAMPSHIRE DRINKING WATER
&GROUNDWATER TRUST FUND

Drinking Water & Groundwater Trust Fund
Loan and Grant Awards
2017-2020

Legend

- Town Boundary
- County Boundary
- State Boundary
- Infrastructure Projects
- Source Water Protection Projects

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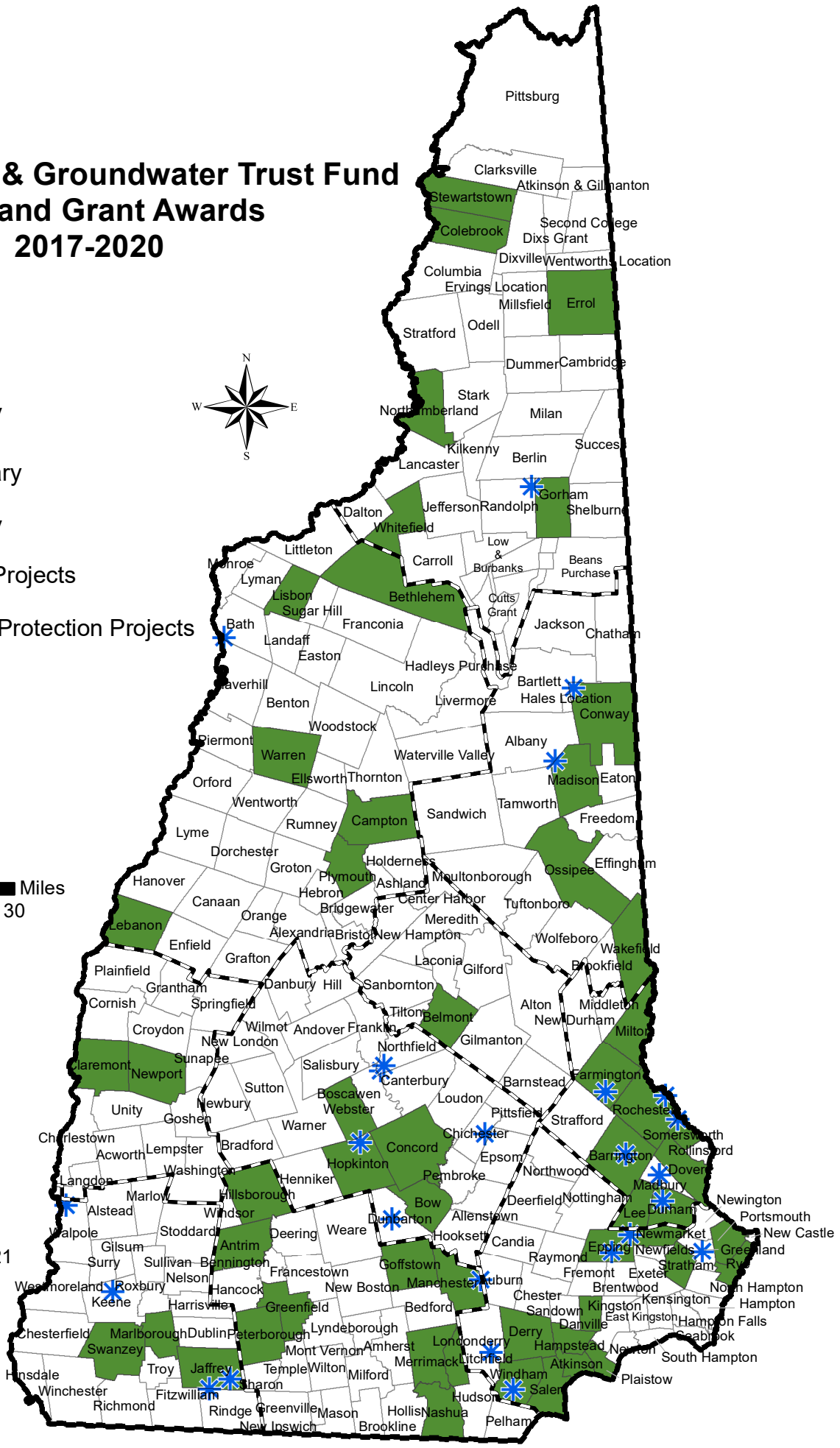

Map prepared on 1/28/2021
by the Department of
Environmental Services

NHDES

TABLE 1
DRINKING WATER AND GROUNDWATER TRUST FUND
Cumulative Summary as of December 31, 2020

BEGINNING FUND BALANCE: July 1, 2017		**$**	**277,619,263**
INCOME:			
Investment Earnings	17,151,411		
Water Rights Reimbursements[1]	3,042,455		
Loan Repayments	75,097		20,268,963
EXPENDITURES:			
Operating Expenses	3,010,559		
Loans	19,256,288		
Grants	45,431,212		
Emergency Drought Assistance Program	26,529		
2019 Legislative Disbursements	571,306		
TOTAL EXPENDITURES			68,295,895
OBLIGATION BALANCE AS OF 12.31.20			
Grants	32,329,341		
Land Grants	599,067		
Loans	29,334,708		
Contracts	1,869,863		
TOTAL OBLIGATIONS			64,132,979
BALANCE BEFORE COMMITMENTS		**$**	**165,459,352**
COMMITMENTS AS OF 12.31.20			
Remaining 2019 Legislative Commitments[2]	5,928,694		
Grants	2,926,886		
Land Grants	1,237,023		
Loans	2,236,065		
TOTAL COMMITMENTS			12,328,668
BALANCE AFTER COMMITMENTS AS OF 12.31.20		**$**	**153,130,684**
20% of Balance		***$***	***30,626,137***

Notes:

1. Sum of payments made by the water recipients of the Southern NH Regional Water Project for their allocation of water supply capacity (the Merrimack Source Development Charge), reserved through a grant agreement between the State of NH and Manchester Water Works.
2. Remaining 2019 Legislative Commitments represent the balance of two appropriations made during the 2019 session to DES ($6 M) and DHHS-Public Health ($500,000). Appropriations expire June 30, 2021.

TABLE 2
DRINKING WATER AND GROUNDWATER TRUST FUND
Summary of Grant and Loan Awards
2017 - 2020

Grants/Loans	2017		2018		2019		2020		Cumulative Totals
	Infrastructure Assistance Program	Source Water Protection Grant Program	Infrastructure Assistance Program	Source Water Protection Grant Program	Infrastructure Assistance Program	Source Water Protection Grant Program	Infrastructure Assistance Program	Source Water Protection Grant Program	
DWGTF Grant Funds	$11,330,000	$200,000	$12,032,277	$2,387,487	$26,543,017	$1,172,910	$17,252,686	$799,730	$71,718,107
DWGTF Loan Funds	$25,066,500	$0	$7,641,000	$0	$17,194,315	$0	$1,851,250	$0	$51,753,065
Total DWGTF Award	$36,396,500	$200,000	$19,673,277	$2,387,487	$43,737,332	$1,172,910	$19,103,936	$799,730	$123,471,172
Total Infrastructure and Water Supply Land Investment of all Approved Projects (see note 1)	***$84,943,800***	***$200,000***	***$32,206,677***	***$9,199,990***	***$68,198,724***	***$7,026,647***	***$40,517,225***	***$2,216,909***	***$244,509,972***

Note:

1. The total drinking water infrastructure and water supply land investment is the total project cost for all projects funded by the Drinking Water and Groundwater Trust Fund.

TABLE 3A
DRINKING WATER AND GROUNDWATER TRUST FUND
Drinking Water Infrastructure Project Status
As of January 1, 2021

AWARD YEAR[1]	APPLICANT	PROJECT LOCATION	PROJECT DESCRIPTION	G&C APPROVAL DATE	GRANT AMOUNT	LOAN AMOUNT
GRANT/LOAN AGREEMENT IN PROGRESS						
2019	Hampstead Area Water Company	--	So. NH Regional Water Project CIAC tax	Anticipated 2021		$ 1,204,815
2019	Montrose Condominium Association, Inc.	Stratham	Water System Upgrades	Anticipated March 2021	-	$ 300,000
2020	Abenaki Water Company, Inc.	Bow - White Rock System	New Source and System Improvement	Anticipated 2021	$ 350,000	-
2020	Antrim Water & Sewer District	Antrim	Connection of a New Well to System and New Transmission Main	Anticipated 2021	$ 537,000	-
2020	Emerald Lake Village District	Hillsborough	Water Main Improvements	Anticipated 2021	$ 315,000	-
2020	Evergreen Terrace	Lee	Infrastructure Improvements: treatment, pump house, distribution system	Anticipated 2021	$ 68,750	$ 206,250
2020	Hopkinton Village Precinct Water System	Hopkinton	Infrastructure Improvements	Anticipated 2021	$ 10,000	$ 95,000
2020	Pillsbury Lake Village District	Webster	Water Main Replacement	Anticipated 2021	$ 157,500	-
2020	Pineland Park	Milton	Water Main Replacement	Anticipated 2021	$ 115,000	$ 345,000
2020	Rock Rimmon Cooperative	Danville	Water Main and Pump House Improvements	Anticipated 2021	$ 250,000	-
2020	Town of Claremont	Claremont	Lead Service Line Replacement and Water Main Improvements	Anticipated 2021	$ 500,000	-
DESIGN IN PROGRESS						
2017	North Walpole Village District	North Walpole	1,4 Dioxane Treatment and/or new supply	November 2019	$ 700,000	-
2019	Abenaki Water - Tioga River	Belmont	Water Valving & Storage	November 2020	$ 5,000	$ 45,000
2019	Lee Oak Cooperative Association	Barrington	Water System Upgrades	July 2020	$ 545,000	-
2019	Manchester Water Works	Manchester	Main Dam Improvements	May 2020	-	$ 1,000,000
2019	Rye Water District	Rye	Wallis Road Water Main Replacement	November 2020	-	$ 315,000
2020	South Main Street Water District	Warren	Emergency Replacement Well	November 2020	$ 75,200	-

TABLE 3A
DRINKING WATER AND GROUNDWATER TRUST FUND
Drinking Water Infrastructure Project Status
As of January 1, 2021

AWARD YEAR[1]	APPLICANT	PROJECT LOCATION	PROJECT DESCRIPTION	G&C APPROVAL DATE	GRANT AMOUNT	LOAN AMOUNT
DESIGN IN PROGRESS (cont.)						
2017	Lebanon, City of	Lebanon	Water main replacement as part of CSO #12 & #13 - Design only.	May 2018	-	$ 189,000
2017	UNH - Durham	Lee Traffic Circle	Water line extension to MtBE contaminated area	March 2019	$ 1,000,000	-
2017	Manchester Water Works	Manchester	Merrimack River Well Collector Water Treatment Plant	February 2020	-	$ 13,000,000
2018	Conway Village Fire District	Conway Village	Main Street water main replacement	January 2019	$ 165,000	-
2018	Plymouth Village Water & Sewer District	Plymouth	Holderness well supply and development	April 2019	$ 1,650,000	-
2018	Rochester Water Department	Rochester	Rt 202A water main extension	June 2019	$ 5,444,000	$ 1,293,000
2019	Beebe River Community Association	Campton	Water System Upgrades	June 2020	$ 50,000	-
2019	Lisbon, Town of	Lisbon	Water System Infrastructure Upgrades - Source Development	April 2020	$ 100,000	-
2020	Jaffrey, Town of	Jaffrey	Cold Stone Springs Water Treatment Plant	December 2020	$ 430,000	-
2020	Peterborough, Town of	Peterborough	Cold Stone Springs Water Treatment Plant	December 2020	$ 4,047,400	$ 3,647,000
CONSTRUCTION IN PROGRESS						
2018	Merrimack Village District	Merrimack	Wells #2, #3, #7 & #8 PFAS Treatment	March 2020	$ 1,450,000	$ 6,264,500
2019	Epping Water & Sewer Commission	Epping	New Water Treatment Plant and MtBE Water Main Extension	May 2020	$ 780,000	-
2019	Hampstead Area Water Company	Atkinson	Treatment conversion, new pumping station & Main Street PRV improvements	September 2019	$ 3,533,750	-
2019	Ossipee Mountain Estates Cooperative	Ossipee	Water System Upgrades	May 2020	$ 350,000	-
2019	Sanbornville Water Precinct	Wakefield	Infrastructure Improvements Phase II	October 2020	$ 100,000	-
2019	Sanbornville Water Precinct	Sanbornville	Rines Road Loop emergency repairs	July 2019	$ 250,000	-
2019	Village District of Eidelweiss (VDOE)	Madison	Water system upgrades	April 2020	$ 295,000	-
2020	Plaistow, Town of	Plaistow	Plaistow - Southern NH Regional Water Interconnection Project	June 2020	$ 5,835,300	-

TABLE 3A
DRINKING WATER AND GROUNDWATER TRUST FUND
Drinking Water Infrastructure Project Status
As of January 1, 2021

AWARD YEAR[1]	APPLICANT	PROJECT LOCATION	PROJECT DESCRIPTION	G&C APPROVAL DATE	GRANT AMOUNT	LOAN AMOUNT
CONSTRUCTION IN PROGRESS (cont.)						
2017	Bethlehem Village District	Bethlehem	Plant improvements and meter project	February 2018	$ 750,000	-
2017	Colebrook, Town of	Colebrook	Lead line replacement, water main replacement and new service meters	May 2019	$ 1,250,000	-
2017	Dover, City of	Dover	Water facilities improvements - Phase II & Somersworth Interconnection	March 2018	$ 2,600,000	-
2017	Merrimack Village District	Merrimack	Turkey Hill Booster Pumping Station	August 2018	-	$ 1,300,000
2017	Whitefield, Town of	Whitefield	Water main replacement	March 2018	$ 4,330,000	-
2018	Dept. of Education	Various	K-12 removal of lead in drinking water	June 2019	$ 1,600,000	-
2018	Lebanon, City of	Lebanon	Lebanon Water Treatment Plant	April 2019	$ 688,000	$ 2,712,000
2018	Marlborough Water Works	Marlborough	2019 water main replacement	June 2019	$ 250,000	$ 750,000
2018	Newmarket Water Works	Newmarket	MacIntosh & Tucker well treatment	June 2019	$ 1,857,000	$ 3,900,000
2018	Pine Grove MHP	Swanzey	New well hookup and replacement of failing distribution lines	November 2019	$ 534,038	-
2019	Derry, Town of	Derry	Derry - SNHP	June 2019	$ 6,701,858	-
2019	North Conway Water Precinct	North Conway	Well 2R Control Building	June 2020	$ 300,000	$ 790,000
2019	Rye Water District	Rye	Garland Road Pump Station Rehab	November 2020	-	$ 800,000
2019	Salem, Town of	Salem	Salem - SNHP	June 2019	$ 12,200,000	-
COMPLETED DRINKING WATER INFRASTRUCTURE PROJECTS						
2018	Errol Water Works	Errol	Water main and associated infrastructure replacement & well/tank take down	April 2019	$ 320,739	-
2018	Goffstown Department of Public Works	Goffstown	Water main extension	March 2019	$ 157,500	-
2018	Manchester Water Works	Manchester	Cohas Pump Station - SNHP	September 2019	$ 259,409	-
2018	Merrimack Village District	Merrimack	PFAS treatment facility for wells #4 & #5	May 2019	$ 405,000	-

TABLE 3A
DRINKING WATER AND GROUNDWATER TRUST FUND
Drinking Water Infrastructure Project Status
As of January 1, 2021

AWARD YEAR[1]	APPLICANT	PROJECT LOCATION	PROJECT DESCRIPTION	G&C APPROVAL DATE	GRANT AMOUNT	LOAN AMOUNT
COMPLETED DRINKING WATER INFRASTRUCTURE PROJECTS (cont.)						
2017	Farmington, Town of	Farmington	System-wide water meter replacement	July 2018	-	$ 588,000
2017	Manchester Water Works	Manchester	MSDC - SNHP	April 2019	$ 11,174,100	-
2017	Newport Water Works	Newport	1st through 4th Streets - infrastructure project	May 2018	-	$ 1,507,000
2017	Newport Water Works	Newport	Newport - SCADA	July 2018	-	$ 107,500
2017	Northumberland, Town of	Northumberland	Groveton Water System water main replacement	February 2018	$ 200,000	-
2017	Pennichuck East Utility - Litchfield	Litchfield	Pennichuck WW Nashua core interconnection	March 2018	$ 600,000	-
2017	Pennichuck Water Works	Nashua & Amherst	Pennichuck core water main replacement.	January 2019	-	$ 3,375,000
2017	Portsmouth, City of	Portsmouth	Breakfast Hill water extension evaluation	March 2018	$ 200,000	-
2017	Textiles Coated International (TCI)	Manchester	Extension of water main and installation of new service connections in Amherst.	September 2017	-	$ 5,000,000
2018	Acorn Terrace Cooperative	Rochester	Water System Improvements Phases III and IV	March 2019	$ 732,000	-
2018	Hampstead Area Water Company	Atkinson	Atkinson Storage Tank	May 2019	$ 1,130,000	$ 1,020,000
2018	Melody Pines Condo Association	Center Conway	Pump House upgrades	August 2019	$ 10,000	$ 61,000
2018	West Stewartstown Water Precinct	West Stewartstown	Distribution system improvements	February 2019	$ 750,000	-
2019	Pennichuck Water Works	Manchester	Merrimack River Intake	June 2019	-	$ 5,500,000

Note:

1. Award year refers to the year the Drinking Water and Groundwater Advisory Commission approved the funding for the project.

TABLE 3B
DRINKING WATER AND GROUNDWATER TRUST FUND
Source Water Protection Project Status
As of January 1, 2021

AWARD YEAR[1]	APPLICANT	PROJECT NAME	PROJECT LOCATION	WATER SYSTEM(S) & SOURCES PROTECTED	PROTECTED LAND [2] (acres)	G&C APPROVAL DATE	GRANT AMOUNT
GRANT AGREEMENT IN PROGRESS							
2018	Barrington, Town of	Haley/Rubenstein/ Panish	Barrington	Portsmouth Water Works (Bellamy Reservoir)	153	Anticipated 2021	$ 190,000
2018	Portsmouth, City of	Chick Property	Greenland	Portsmouth Water Works WHPA	3	Anticipated 2021	$ 90,000
2018	Windham, Town of	Clyde Pond	Windham	Windham High School WHPA	25	Anticipated 2021	$ 26,450
2019	Five Rivers Conservation Trust	Koerber - Dunbarton Elementary School WHPA	Dunbarton	Dunbarton Elementary School 0685010-001 WHPA	9	Anticipated 2021	$ 13,248
2019	Rindge Conservation Commission[2]	Rindge - Jaffrey WHPA	Rindge/Jaffrey	Jaffrey Water Works 1221010 WHPA	112	Anticipated 2021	$ 117,595
2020	Chichester, Town of	Valley View - Chichester Central School WHPA	Chichester	Chichester Central School: 0455010-01 WHPA	20	Anticipated 2021	$ 64,347
2020	Londonderry, Town of	Moose Hill - Londonderry WHPAs	Londonderry	Century Village Condos: 1392180-01, 05 WHPAs; Southview Condominiums: 1392300-01 WHPA	22	Anticipated 2021	$ 472,415
2020	Society for the Protection of NH Forests	Stillhouse Moran - Penacook Boscawen WHPA	Northfield	Penacook Boscawen Water-Precinct; 0251010-02, 03, 04 WHPAs	28	Anticipated 2021	$ 53,968
2020	Southeast Land Trust (SELT)	Salmon Falls River (Rochester)	Rochester	Salmon Falls River, Somersworth WW: 2151010-07	60	Anticipated 2021	$ 209,000
IN PROGRESS							
2018	Southeast Land Trust	Lamprey River - Epping	Epping	UNH-Durham (Lamprey River)	163	March 2019	$ 271,787
2019	Society for the Protection of NH Forests	Emerson - Oyster River	Durham	UNH/Durham 0691010-002 Oyster River HAC	34	June 2020	$ 73,000
2019	Somersworth	Lily Pond - Somersworth WHPA	Somersworth	Somersworth Water Works 2151010-006 WHPA and 007 Salmon Falls River HAC	40	August 2020	$ 100,000
2019	Southeast Land Trust	Sanborn - Lake Massabesic	Auburn	Manchester Water Works 1471010-001 Lake Massabesic HAC	130	December 2020	$ 250,000
2019	The Nature Conservancy	Surry Mountain - Keene WHPA	Gilsum	Keene Water Dept. 1241010 -001, 002, & 003 WHPA	252	July 2020	$ 332,067
COMPLETED SOURCE WATER PROTECTION GRANT PROJECTS							
2017	City of Portsmouth	Bellamy Reservoir Protection	Madbury	Portsmouth Water Works (Bellamy Reservoir)	72	March 2018	$ 200,000
2018	Ammonoosuc Conservation Trust	Jean Chamberlain	Bath/Haverhill	Woodsville Water & Light (Ammonoosuc River)	45	June 2020	$ 73,700
2018	Gorham, Town of	Ice Gulch & Perkins Brook	Randolph/Gorham	Gorham Water & Sewer (Ice Gulch & Perkins Brook)	3497	June 2020	$ 300,000
2018	Hopkinton, Town of	Chesley	Hopkinton	Concord (Contoocook River), Pennichuck (Merrimack River)	6	December 2020	$ 82,000
2018	Monadnock Conservancy	Bearce Conservation Easement	Jaffrey/Rindge	Franklin Pierce University WHPA	64	December 2019	$ 35,000
2018	Monadnock Conservancy	Wood Farm Easement	Walpole	Cheshire County Complex (Connecticut River), aquifer	29	October 2019	$ 87,000
2018	Society for the Protection of NH Forests	Parker Farms	Auburn	Manchester Water Works (Lake Massabesic)	87	June 2019	$ 375,000
2018	Society for the Protection of NH Forests	Stillhouse Forest	Canterbury/Northfield	Pennacook Boscawen Water Pct WHPA, Pennichuck (Merrimack River)	234	June 2020	$ 150,000

TABLE 3B
DRINKING WATER AND GROUNDWATER TRUST FUND
Source Water Protection Project Status
As of January 1, 2021

AWARD YEAR[1]	APPLICANT	PROJECT NAME	PROJECT LOCATION	WATER SYSTEM(S) & SOURCES PROTECTED	PROTECTED LAND [2] (acres)	G&C APPROVAL DATE	GRANT AMOUNT
COMPLETED SOURCE WATER PROTECTION GRANT PROJECTS (cont.)							
2018	Southeast Land Trust	Governor's Run - Epping	Epping	Town of Epping WHPA	18	April 2019	$ 200,000
2018	Southeast Land Trust	Rochester Water Supply	Farmington	Rochester Water Dept (Rochester Reservoir Watershed)	315	March 2019	$ 410,000
2018	Upper Saco Valley Land Trust	World Fellowship Center	Albany	Piper Meadows mobile home park WHPA, aquifer	64	July 2020	$ 29,550
2018	Upper Saco Valley Land Trust	Lucy Brook Farm	Conway	No Conway Water Pct WHPA, aquifer	41	August 2020	$ 84,000
2019	Portsmouth	Duffy - Bellamy Reservoir	Madbury	Portsmouth Water Works 1951010-009 Bellamy Reservoir	107	December 2020	$ 287,000

Notes:

1. Award year refers to the year the Drinking Water and Groundwater Advisory Commission approved the funding for the project.
2. The protected land is the protected acreage funded through the Drinking Water and Groundwater Trust Fund grant award.

The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

February 1, 2021 via electronic mail

Senator Chuck Morse, Chairman
Drinking Water and Groundwater Trust Advisory Commission

Project: Pound Road Water Works (Wilmot) – **Pump Building Upgrade**

Subject: **Drinking Water and Groundwater Trust Fund (DWGTF) Funding Application Forms for the Special Projects Assistance Program,** dated October 26, 2020

Dear Chairman:

The New Hampshire Department of Environmental Services (NHDES) has reviewed the subject special project application for the Pound Road Water Works (Water Works) Pump Building Upgrade. Section 5.A.2 of the DWGTF Award Plan adopted May 11, 2020 (Award Plan) outlines three tasks to be completed by NHDES when an application to the Special Project Assistance Program is received: 1) review the application to determine that it meets the project readiness eligibility requirements outlined in Section 5.A.1 of the Award Plan; 2) screen the applications using the criteria identified in Drinking Water Loan and Gran Program DWGTF Rules for Construction Projects adopted March 11, 2019 (Construction Rules); and 3) evaluate if the project demonstrates one or more of the circumstances for special project consideration identified in the Award Plan.

The application meets the eligibility requirements of Section 5.A.1 of the award plan which requires the submittal of a certificate of the authority to submit the application and a planning document. Based on the screening and evaluation requirements of the Award Plan, NHDES is of the opinion that the project demonstrates the circumstances for the Commission's consideration as a special project out-of-cycle of the annual application review process as defined in the Award Plan and the project meets several of the screening criteria presented in the Construction Rules. Specifically, the special project application demonstrates that the project is time critical.

The subject project is part of the Water Works' corrective action plan in response to a 2019 NHDES Sanitary Survey which sited unsafe conditions and hazards with the existing below grade pump house. The project is to replace the existing facility with a new above grade pump house and storage tanks. The Water Works was approved for a Drinking Water State Revolving Fund loan (DWSRF) in 2019 to fund the system upgrades. The project went out to bid in September 2020 and the lowest bid was $97,600 over the unspent funds remaining in the DWSRF loan ($277,500). In combination with a $15,100 contribution from property-owner funded Pump House Fund (established in 2019), the Water Works is requesting an $82,500 grant to cover the gap between the balance of DWSRF loan funds and the 2020 bid prices. The Water Works will be rebidding the project this spring. A summary of how the project demonstrates the circumstances for consideration to the Special Projects Assistance Program is provided below.

Application is Time Critical

NHDES concurs that the Water Works' application is time critical due to the need to award a construction contract and start construction late spring/early summer 2021. The Water Works immediately took steps to apply for and was awarded a DWSRF loan in 2019 to fund the necessary system upgrades and the project went out to bid in September 2020 to move the project forward before their May 2021 deadline to implement the corrective action.

The Water Works is rebidding the project this spring when the bidding climate is anticipated to be slightly more competitive resulting in a lower cost. In order to award the construction contract if bids are favorable and within their budget this spring, they will need to have all the funding in place.

Grant Request due to Economic Hardship

Based on the subject application, the Water Works is requesting $82,500 in grant funds to cover the cost difference between the available DWSRF funds and the bid prices from last fall (2020). If awarded, the DWGTF grant would be 22% of the estimated project cost. A grant is being requested in lieu of an increase to the DWSRF loan to minimize the impact to the small rate base (approximately 22 households) and the authority to borrow is capped at $300,000. As noted in the application, if the project is funded entirely with loan funds, the projected affordability index (AI) would be 1.89%, a significant increase from the current AI of 1.37%. The property owners are contributing $15,100.

NHDES is of the opinion that the grant request should be considered in the Special Project Assistance Program and concurs that the subject project is time-critical and may not be affordable without DWGTF assistance.

If you have any questions, please contact me at 603-848-4259 or Erin.Holmes@des.nh.gov.

Sincerely,

Erin J Holmes

Erin Holmes, P.E.
Drinking Water and Groundwater Trust Fund Administrator
MtBE Remediation Bureau

Enclosures: Drinking Water and Groundwater Trust Fund funding applications
NHDES Screening Worksheet

Route/cc: Tom Willis, NHDES DWGB

CC: Michael Juranty, P.E., NHDES MtBERB

NEW HAMPSHIRE DRINKING WATER &GROUNDWATER TRUST FUND

Criteria to be Considered by DWGTF Advisory Commission - Screening Worksheet

The Drinking Water and Groundwater Trust Fund (DWGTF) **Drinking Water Loan and Grant Program Rules for Construction Projects**, adopted March 11, 2019 by the DWGTF Advisory Commission, outlines *criteria that may be considered by the Commission when determining whether or not to award a loan or grant*. In accordance with the DWGTF 2019 Award Plan, the project has been screened by the New Hampshire Department of Environmental Services.

Applicant Name:	Pound Road Water Works
Project Name:	Water System Improvements Project
Application Date:	October 26, 2020

Criteria Screening Summary Table		
YES	**NO**	**NHDES Screening Notes**
1. Proposed project results in the removal, reduction or mitigation of contamination related to groundwater or drinking water.		
	X	System has been in compliance with current water quality standards
2. Proof of thoroughness with respect to both the application and project development.		
X		Application prepared by Horizons Engineering based on a thorough evaluation of system needs. The purpose of this application is to obtain gap funding to construct the project to supplement the DWSRF loan for $300,000 that was approved in funding year 2019. Construction bid received to construct project exceeded SRF funds available.
3. Demonstrates project readiness through methods including but not limited to letters of support from local entities, preparation and submittal of preliminary engineering reports, and confirmation of approval of funds from leveraged funding sources.		
X		Support letter Board of Commissioners, Resident Vote completed September 9, 2019, DWSRF funding had been approved, but amount did not fully fund scope of work after construction bids were received.
4. Project is consistent with the applicant's established Asset Management Program and proposed management of assets, Capital Improvement Plans, and rate analysis associated with the project.		
X		Pump house and storage tank does not meet current standards – system upgrade will correct these deficiencies
5. Project has impact on economic development.		
	X	
6. Project is energy efficient or increases energy efficiency of the system.		
X		Modest energy efficiency improvements will be realized with the installation of new equipment
7. Project improves water efficiency.		
X		New metering and possible SCADA (it is listed as an ad – alternate) installation will enable operators to perform real time and historical monitoring of water use to timely discovery and react to water usage anomalies.
8. Project enhances source water protection or acquisition of water sources for public consumption.		
	X	This is an upgrade of existing deficient infrastructure
9. Project involves a unique or innovative approach.		
X		Involves the use of a concrete storage tank that doubles as the foundation for the pump house over it. This reduces the footprint of the overall pump station
10. Project completion will result in the interconnection of two or more Public Water Systems (PWS).		
	X	
11. Project has long term viability.		
X		Reinvigorates an existing deficient and aging system ensuring complaint water supply for years to come
12. Project is for a PWS serving customers with a low Median Household Income or high Affordability index.		
	X	System cost trends at about average cost versus MHI (0.99 percent).

FORM 1

DWGTF FUNDING APPLICATION FORM
for the Annual Drinking Water Construction Projects Assistance Program

NEW HAMPSHIRE DRINKING WATER &GROUNDWATER TRUST FUND

RSA/Rule: RSA 485-F

The Drinking Water and Groundwater Advisory Commission is seeking funding applications requesting assistance from the Drinking Water and Groundwater Trust Fund (DWGTF) for drinking water infrastructure improvement projects.

Submission Instructions: Submission of applications online through State of NH Online Forms is strongly encouraged to reduce errors and processing time. ***Anticipated to be available online June or July 2020.***

1. Visit the State of NH Online Forms web portal at https://onlineforms.nh.gov.
2. Register for an Online Form account. If you already have an account from submitting other State of NH Online Forms you can use it for this application.
3. Click the "Finder" button in the top right. Search for "DWGTF". Select the "DWGTF Funding Application Form for the Annual Drinking Water Construction Projects Assistance Program".
4. Complete all steps and submit. You can save and return to your application before submitting.
5. After submitting, you can track the status of your application through the State of NH Online Forms web portal.

If the applicant is unable to submit an online Form, a PDF may be emailed to ***erin.holmes@des.nh.gov***.

The deadline for submission is September 10, 2020 (midnight).

For eligibility requirements, guidance in completing this application, and additional information regarding the criteria the Commission may use in making funding decisions, refer to the Advisory Commission's **"Rules for Construction Projects"** and **"2020 Award Plan"** posted on the Trust Fund website at https://www4.des.state.nh.us/nh-dwg-trust/

1. APPLICANT INFORMATION			
APPLICANT NAME: Kenneth E Aldrich			
ORGANIZATION NAME: Pound Road Waterworks			
PWS # (if applicable): 2102010	Ownership: ☐ Public (e.g. Municipal) ☒ Private (e.g. Mobile Home Park/Condo Association)		
ADDRESS: PO Box 88			
CITY: Wilmot		STATE: NH	ZIP: 03287
CONTACT PERSON: Keneth E Aldrich		TITLE: Treasurer	
PHONE: 603-526-2942	EMAIL: poundroadwater@gmail.com		

2. THRESHOLD REQUIREMENTS TO SUBMIT AN APPLICATION
Instructions: *In accordance with the Commission's "2020 Award Plan", the Commission requires that the funding applications include two submittals to meet the threshold for project readiness. These forms are available on the* Trust Fund website at https://www4.des.state.nh.us/nh-dwg-trust/ ***Attach these submittals to this application. Applications submitted without these attachments will be considered ineligible and will not be reviewed.***
FORM 2 – Authority to Submit a Funding Application X
FORM 3 – Planning Document X

FORM 1

3. PROJECT INFORMATION			
PROJECT NAME: Pound Road Waterworks Pump Building Upgrade			
SELECT ONE: ☐ Design/Preliminary Engineering Only	☐ Design and Construction	☒ Construction Only	
PROJECT DESCRIPTION: *Provide a concise (<50 words) summary of the project. If additional space is needed, provide additional information in the Planning Document (see Section 2).* The Pound Road Waterworks serves 53 people through 21 service connections. This project consists of replacing the existing pump house and 45 year old steel storage & pressure tanks with a new pump house, constant pressure variable speed pumps, and a concrete storage tank.			
PRIORITY: *If you are submitting Funding Applications for multiple projects, please rank the projects in order of priority:* 1. 2.			

4. PROJECT COST/BUDGET (DRINKING WATER COSTS ONLY)	
Do not include preliminary design engineering and testing costs prior to submittal of the funding application as a component of total project cost.	
CATEGORY (add rows as needed)	**AMOUNT**
Construction Costs	$ 357,900.00
Construction Contingency	$
Engineering/Planning Costs	$
Other Costs (describe): Construction Management	$ 17,200.00
TOTAL PROJECT COST	$ 375,100.00
Project costs are based on (e.g. engineering study w/ date and author, bid prices, etc.): Bid from Nealy & Chase dated 9/05/2020 and Horizons Change of Scope dated 9 /21/2020	

5. FUNDING REQUEST (DRINKING WATER COSTS ONLY)		
The sum of Other Funds Contributing to the Project + Requested Trust Fund Loan + Requested Trust Fund Grant must equal the Total Project Cost from Section 4 above.		
Note: Per the Commission's rules, the Commission will endeavor to leverage the DWGTF to the greatest extent possible by taking into consideration, among other things, supplemental funds provided by the applicant. Applications for loans or grants that demonstrate that the applicant has exhausted all other possible funding sources for the proposed project may be given priority. There is no match requirement for loans; however, project proposals that provide the greatest amount of funds from sources other than DWGTF grants or loans whenever possible may be given priority.		
OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$277,500	Source: DWSRF
OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$ 15,100	Source: PRWW Households
OTHER FUNDS CONTRIBUTING TO THE PROJECT *(see Section 7):*	$	Source:
REQUESTED TRUST FUND **LOAN** AMOUNT: $ *(This must be a specific dollar amount.)*	LOAN PERCENT OF TOTAL PROJECT COST: *(See Section 5 of the Commission's "2020 Award Plan".)*	
REQUESTED **LOAN** TERM (select one): ☐ 5 ☐ 10 ☐ 15 ☐ 20 ☐ 25 *The loan term cannot exceed the useful life of the financed improvement(s).*		
REQUESTED TRUST FUND **GRANT** AMOUNT: $ 82,500. *(This must be a specific dollar amount. Complete Section 6 if requesting Trust Fund grant.)*	GRANT PERCENT OF TOTAL PROJECT COST: 22% *(See Section 5 of the Commission's "2020 Award Plan".)*	
Funding Plan Narrative: *If appropriate, attach a narrative explaining the Funding Plan in more detail. For example, if non-DWGTF funds have not been confirmed, explain the applicant's plan for funding the project if that outside funding is not approved.*		

FORM 1

6. GRANT REQUEST JUSTIFICATION

Instructions: *If you are requesting grant funds, please complete the section below. The DWGTF Advisory Commission will review grant requests to make funding decisions.*
Note: Per the Commission's rules, projects that first request DWGTF loans whenever possible may be given priority over similar projects that request DWGTF grants. Projects that request a smaller proportion of DWGTF grant as compared to DWGTF loans whenever possible may be given priority.

Why does this project require grant funding? After completing the design in August 2020 we solicited bids in September, but the only bid we received was $357,900 which plus $17,200 for construction management was $97,600 over what we had left in DWSRF loan. We plan to request more bids in the Spring of 2021.

Has the applicant maximized the proportion of Trust Fund loan versus Trust Fund grant requested? ☐ yes ☒ no

7. OUTSIDE FUNDING SOURCES

Instructions: *The Advisory Commission encourages applicants to seek outside funding sources and may consider the overall funding plan and percentage of outside funding sources when making funding decisions. To assist the Commission in evaluating this project, please provide the following information.* ***Enter these amounts in Section 5 above.***

Have you applied to the Drinking Water State Revolving Fund (DWSRF) for this project? ☒ yes ☐ no
If yes, how much did you request and what is the status? If no, why not? We are approved for a $300,000 DWSRF loan and have spent $22,500 for engineering design leaving $277,500 left.

Have you applied to the USDA Rural Development (RD) program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? Wilmot's MHI of $72,656 is 98% of the NH state MHI of $74,057 which is close to this programs cutoff of 100% of the state MHI. It is unlikely that we would get a USDA RD grant.

Have you applied to Community Development Block Grant (CDBG) program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? The maximum MHI for this program is 80% of the state MHI but Wilmot's MHI of $72,656 is 98% of the NH state MHI of $74,057.

Have you applied to Northern Border Regional Commission program for this project? ☐ yes ☒ no
If yes, how much did you request and what is the status? If no, why not? Wilmot is in Merrimack County which is not one the counties eligible for funding.

Have you applied to other funding programs besides those listed above? ☐ yes ☒ no
If yes, please specify which programs, how much did you request, and what is the status? If no, why not? We cannot find other sources with interest rates as affordable as the DWSRF.

Will developers, property owners, or other private entities be contributing to the project? ☒ yes ☐ no
If yes, what is the dollar amount, what is the status, and are there conditions on those contributions? If no, why not? One hundred dollars of our quarterly rate of $250 goes into a savings account for the new Pump House. At present this account has $8,800 and expect to add another $6,300 by July 2021 for a total of $15,100.

Is the applicant contributing its own funds to the project (cash, capital reserve, bonding from another lender, etc.)? *Do not include the DWGTF loan and grant being requested in Section 3 above.*: ☒ yes ☐ no
If yes, what is the dollar amount, what is the status, and are there conditions on those contributions? If no, why not?
See above since he property owners are the owners of the Pound Road Waterworks

Has the applicant exhausted all other possible funding sources for the proposed project? ☒ yes ☐ no

8. OTHER CONSIDERATIONS

Instructions: *The Advisory Commission may consider the criteria below when determining whether or not to award a loan or grant. To assist the Commission in evaluating this project, please provide the following information.*

Will the proposed project result in the **removal, reduction, or mitigation of contamination related to groundwater or drinking water?** ☐ yes ☒ no Please explain briefly: This is a replacement the old pump house with a new facility.

Has a **preliminary engineering report** been prepared for the project? *Attach a copy if desired. The Commission may request a copy during its review.* ☐ yes ☒ no Date and name of preparer:

FORM 1

Median Household Income (MHI): $ 72,656
If known, MHI of population served (using the results of a recent income survey or latest data from the American Community Survey). Note: An income survey may be required for small, privately-owned water systems serving portions of a community where the survey data does not accurately reflect the income of the residents.

Current Annual Residential Water Rate: $ 1,000
Calculate based on 71,996 gallons/year. If cost of water is included in other charges (rent, condominium fee), break out the estimated annual cost per unit of water. NHDES may request back-up documentation as these figures are used to determine affordability.

Projected Annual Residential Water Rate at Project Completion: $ 1,376
*If you have calculated the projected water rate at project completion, please enter it here and provide an explanation of how it was calculated. If not, enter TBD.*This is based the on a $382,500.00 loan at 1.704% for 30 years which calculates to be $776 a year per household. This when added to a yearly operating cost of $600 results is an annual cost per household of $1376.

Affordability Index: 1.89 (Projected Annual Water Rate / MHI x 100)

List **letters of support** from local entities. Attach copies if available.

Is the project consistent with the applicant's **Asset Management Program?** ☐ yes ☒ no Please explain briefly: We do not have an Asset Management plan.

Is the project consistent with the applicant's **Capital Improvement Plan?** ☐ yes ☒ no Please explain briefly: We do not have a Captial Inprovement plan.

Has the applicant conducted a **rate analysis** for the project? ☐ yes ☒ no Please explain briefly: The rate is the loan payment ($776 per year for $380K,30 year loan) added to the operating cost ($600 per year) for a total of $1376.00.

Briefly describe the project's impact on **economic development.** None

Will the project improve **energy efficiency?** ☒ yes ☐ no Please explain briefly: The new pump system is more modern with improved technology. This will allow the pumps to operate at variable speed and will reduce the number of startups that the pumps need to operate. This will improve the energy efficiency of the pump house.

Has the applicant completed an **energy audit?** ☐ yes ☒ no
If so, is this project a recommendation of the audit? ☐ yes ☒ no Please explain briefly:

Will the project improve **water efficiency?** ☐ yes ☒ no Please explain briefly: The intent of the project is to construct a new pump house to supply water to the residents of Pound Road. This upgrade will continue to supply water, but will not improve the efficiency of water use.

If applicable, describe how the project involves a unique and **innovative approach** and how it could be a valuable demonstration project to other water systems and/or communities.

Will the project result in the **interconnection** of two or more Public Water Systems (PWS)? ☐ yes ☒ no Please explain briefly:

Will the project result in the elimination of a PWS through **connection to a more viable PWS?** ☐ yes ☒ no Please explain briefly:

How many estimated **people** will the project serve? **53**

How many **service connections** will the project serve? **21**

FORM 1

9. PROJECT SCHEDULE	
Date Authority to Borrow and/or Accept Grant Funds was received or will be received	October 28,2020
Anticipated Design Start Date	Design Complete on Aug 21,2020
Anticipated Construction Start Date	March 15, 2021
Anticipated Project Completion Date	August 1, 2021

AUTHORIZATION/CERTIFICATION	
By signing below, you are certifying that the information in this Funding Application and in any attachments are true, correct and complete to the best of the representative's knowledge and that you are authorized to submit this Funding Application. ***Also attach FORM 2 – Authority to Submit a Funding Application (see Section 2).***	
Signature of Authorized Representative: Kenneth E Aldrich	Date: Oct. 28, 2020
Print Name: Kenneth E. Aldrich	Title: Treasurer

FORM 1S

1. SPECIAL PROJECT SUPPLEMENTAL INFORMATION
CONTAMINATION. Does this project address an immediate threat to public health from contaminated drinking water? ☐ yes ☒ no Please explain briefly: *Attach relevant testing data.*
TIME CRITICALITY. Does the time critical aspect of this project make it impractical for the project to be considered in the Commission's annual application review? ☒ yes ☐ no Please explain briefly: We are planning to rebid in the spring and our DWSRF loan expires on June 1, 2021. We will likely have to apply for a 60 day extension, but it would be desirable to finish by the end of 2021.
FINANCIAL HARDSHIP. Is this project unaffordable without a grant from the DWGTF? ☒ yes ☐ no Please explain briefly: Our projected affordability index without this grant is 1.89% *Provide additional information on water rates, median household income, and grant request on the DWGTF Funding Application Form for the Annual Drinking Water Construction Projects Assistance Program.*
ECONOMIC GROWTH. Does the project create or expand drinking water systems which in turn expand the economic well-being of a community? ☐ yes ☒ no Please explain briefly: *Provide supporting documentation such as Memoranda of Understanding, letters of support, etc.*

AUTHORIZATION/CERTIFICATION	
By signing below you are certifying that the information in this Funding Application and in any attachments are true, correct and complete to the best of the representative's knowledge and that you are authorized to submit this Funding Application.	
Signature of Authorized Representative: Kenneth E Aldrich	Date: Oct. 28, 2020
Print Name: Kenneth E. Aldrich	Title: Treasurer

NEW HAMPSHIRE DRINKING WATER
&GROUNDWATER TRUST FUND

FORM 2
DWGTF
AUTHORITY TO SUBMIT A FUNDING APPLICATION
for the Construction Projects Assistance Program

RSA/Rule: RSA 485-F

In accordance with its "2020 Award Plan", the NH Drinking Water and Groundwater Advisory Commission "Commission" requires that the funding applications for the Construction Projects Assistance Programs include submittal of an Authority to Submit a Funding Application to meet the threshold for project readiness.

Applications submitted without this attachment will be considered ineligible and will not be reviewed.

The purpose of this form is to certify that the person submitting a Funding Application to the Drinking Water and Groundwater Trust Advisory Commission for financial assistance from the Drinking Water and Groundwater Trust Fund for drinking water construction projects is authorized to do so by the governing body of the water system seeking funding. This form is not required if the funding application is submitted directly by the governing body of the water system.

Pursuant to the requirements of the Commission's "2020 Award Plan":

- ☐ This Certificate shall be completed and signed by a member of the governing body (i.e., Commission, Board) other than the person being authorized;
- ☐ The authorization to execute any documents necessary to complete the funding application is restricted to a member of the governing body or employee of the water system Owner; and
- ☐ Meeting minutes shall accompany this certificate.

Authority to Submit Drinking Water and Groundwater Trust Fund Funding Application

[Pound Road Waterworks]
[P.O. Box 88
Wilmot, NH 03287

I, Kenneth E. Aldrich/Treasurer, of the Pound Road Waterworks, do hereby certify that at a meeting held on October 26, 2020, the Board of Directors voted to submit a Drinking Water and Groundwater Trust Fund funding application to the NH Department Environmental Services to fund a water system improvement project.

The Pound Road Waterworks further authorized Kenneth E. Aldrich/Treasurer to execute any documents which may be necessary to complete the funding application.

Signature Kenneth E Aldrich

IN WITNESS WHEREOF, I have hereunto set my hand as Secretary of Pound Road Waterworks, the 28th day of OCTOBER 2020.

Witness Nola E. Aldrich

Erin.holmes@des.nh.gov | (603) 271-8321
https://www4.des.state.nh.us/nh-dwg-trust/

POUND ROAD WATER WORKS NOTICE OF BID REVIEW MEETING
MONDAY, OCTOBER 26, 2020 AT 6:00pm VIA ZOOM

Invited: Jim Orrok, Dawn Fontaine, Ken Aldrich, Nola Aldrich, Michael Warning, Diane Warning, Shannon Martin and Paul Billadeau. Ryan Libbey from Horizons.

Attended: Dawn Fontaine, Ken Aldrich, Nola Aldrich, Michael Warning, Diane Warning, Shannon Martin and Paul Billadeau. PRWW member Kim Esposito joined the call. Ryan Libbey from Horizons.

MEETING AGENDA – Presented by Ken Aldrich

1. Vote to authorize the treasurer to submit the DWGTF Grant application forms. Ken had sent us all the forms to apply for a grant. If we don't get the grant, then we'll have to consider applying for an extension to our existing loan. MOTION: The Board authorizes Treasurer, Ken Aldrich, to apply for the DWGTF Funding Application and to submit all required documents. The vote was taken and quorum was achieved with 6 YES votes.

2. Michael Warning suggested that we have an early December meeting with Jim Orrok to establish what he would be doing as our project General Contractor with ongoing support by Horizons Engineering.

3. Review of the Horizons Change of Scope. The new agreement will cover the time when we start the bid process again. Ryan explained how Horizons will provide oversight and coordination the contractors, doing quality control on materials used and that the design is being installed. The work will be bonded. They will submit the necessary disbursement requests for payments to the Contractor to DES. PRWW will issue checks to the contractors once DES sends us the money.

Meeting ended at 6:48pm.

DW/NA/

FORM 3 Planning Document

Pound Road Waterworks

1. Existing Conditions. The Pound Road Waterworks serves approximately 53 people through 21 service connections. The pump house is a confined space and contains hazards making it unsafe for system operators or anyone else to enter. The rear wall of the pump house has several large cracks and has received temporary attention, but is still very unsafe. The pump house has the potential of flooding making it very dangerous with wet conditions for all the electrical operations, and mold throughout the building. Also, the storage tanks were constructed in 1972, and have never been inspected. The rusted condition of the tanks makes for a very dangerous situation. This confined space and hazards must be corrected.

2. Project Need

We need to replace our 48-year old below grade facility and storage tanks with a new above-grade pump house and new storage tanks. To continue with the present facility we would have a significant deficiency and could have a catastrophic tank failure.

3. Alternative Evaluation.

a. Do Nothing. Due to the existing conditions described above we failed a Sanitary Survey on April 12, 2019. To avoid a violation our corrective action plan was to replace our old system.

b. Replace the old atmospheric tank, hydro-pneumatic tank and below-grade facility with a new facility with variable frequency drive booster pumps on top of a precast concrete atmospheric tank.

4. Recommended Alternative

The recommended alternative as stated above is to replace the old atmospheric tank, hydro-pneumatic tank and below-grade facility with a new facility with variable frequency drive booster pumps on top of a precast concrete atmospheric tank.

5. Basis of Design

5.1. Existing Well Capacity:

Per Operator: Estimated Well Yield = 35 GPM (Gallons/Minute) per
info provided by NHDES, Well Yield is consistent with 35 GPM.
Well Long TermYield = 1/2 of estimated yield = 17.5 GPM. This is consistent with estimated long term yield. Use 17.5 GPM

Design Flows

5.2. Average Day Design (ADD)
· System currently serves 21 homes
· Assume average of 2.5 bedrooms for each home on the system
· Per ENV-DW 405.10, Use 150 GPD/Bedroom
· ADD = 21 Homes X 2.5 Bedrooms/Home X 150 GPD/Bedroom = 7,875 GPD
· Based on weekly water meter readings taken by Pound Road Waterworks,

from January 2020 to March 2020, the high average daily flow is approximately 2000 gallons per day. Per NHDES guidance, a factor of 2.0 should be considered if weekly reading are available and 3.0 if monthly readings are available, but there is not yet one year's worth of data, use a factor of 2.25.
ADD = 2000 GPD X 2.25 = 4,500 GPD

5.3. Max Day Demand (MDD)

· Per ENV-DW 405.12, Water source shall provide a minimum of twice daily design flow
· MDD = (2 X 4500 GPD)/ 1440 Minutes/Day = 6.3 GPM Minimum < 20 GPM

5.4. Peak Day Demand (PDD)

· Per ENV-DW 405.19, Peak demand shall be 10 times Average Day demand. (ADD).
· (10 X 4500 GPD)/ 1440 (Min./Day) = 31.3 GPM (Gallons Per Minute)

5.5. Storage Tank Design

· Per ENV-DW 405.18, Storage Tank Sizing from Table 405-3.
· The MDD is 6.3 GPM.
· The well yield is 35 GPM X 0.5 = 17.5 GPM.
· 17.5 GPM/ 6.3 GPM = 2.778 = 100%· Therefore use 1.0 times Design Flow.
· Required Storage in Tank = 4500 Gallons X 1 = 4500 Gallons
· Required Tank Volumes
Below Pump Intake = 539 Gallons
Pump Operational Volume= 5395 Gallons

5.6. Booster Pump Design
· Q = Peak Demand = 31.3 GPM
· Total Dynamic Head (TDH) = He + Ho + Hf
· Max Elevation = 900 Feet, Pump Elevation = 850 Feet (From USGS)
· He (Elevation Head = 50 FEET
· Ho (Operational Head) = 60 PSI (Max.) X (1 Ft./ 0.43 PSI) = 140 Feet
· Hf (Frictional Head) = (Hazen-Williams)
l = 2900 Feet, C = 140, Q = 32 GPM, dh = 3 Inch
Hf = 9.5 Feet, Assume 10 Feet
· TDH = 200 Feet
· Booster Pump equivalent to Goulds 35GS20 Dual Alternating.
· Booster Pump system components shall be as below, or approved equal
(Two of each of the following):
- Goulds 35GS20
- 4 Inch Single-Phase Motor
- Goulds M20412 Drive
- Goulds 21A DVDT Load Filter

FORM 3 Planning Document
Pound Road Waterworks

6. Opinion of Project Cost

The project costs are based upon a bid dated 9/05/2020 received from Nealy & Chase and a bid from Horizons Engineering for construction management dated 9/21/2020. Because the total of these bids was $97,600.00 over what we had left in our DWSRF loan, we decided to wait until the spring of 2021 to request new bids.

Bid Item	Description	Price
1	General Conditions and Miscellaneous Work	$113,442.06
2	Temporary Systems Operations Provisions,Switch over, and Decommission	$1200.96
3	Site Work Complete	$124,443.30
4	Concrete Work Complete	$0.00
5	Building Complete	$30,996.74
6	Plumbing and Mechanical Work Complete	$34,413.86
7	Electrical Work Complete	$29,003.08
Subtotal	Construction Bid	$337,500.00
8	Standby Generator	$20,400.00
9	Engineering Management	$17,200.00
Total		$375,100.00

Table of Contents

Full Application

version 1.6

(Submission #: HP3-VE7Y-4RH9W, version 1)

Details

Submitted	10/28/2020 (60 days ago) by Kenneth Aldrich
Submission ID	HP3-VE7Y-4RH9W
Status	Submitted
Active Steps	Download Submission

Form Input

Applicant Information

Applicant Name
Kenneth Aldrich

Organization Name
Pound Road Water Works

PWS# (if applicable)
2102010

Ownership
Private (e.g., Mobile Home Park/Condo)

Address

PO BOX 88

WILMOT, NH 03287

Contact Person

Name
Kenneth E Aldrich
Title
Treasurer

Contact Email
poundroadwater@gmail.com

Contact Phone
603-526-2942

Community Information

Median Household Income (MHI)
If known, MHI of population served (using the results of a recent income survey or latest data from the American Community Survey). Note: An income survey may be required for small, privately-owned water systems serving portions of a community where the survey data does not accurately reflect the income of the residents.
American Community Survey

MHI
$72,256.

Current Annual Residential Water Rate

Based on 71,996 gallons/year. If cost of water is included in other charges (rent, condominium fee), break out the estimated annual cost per unit of water. NHDES may request back-up documentation as these figures are used to determine affordability.

Current Rate
$1,000.

Projected Annual Residential Water Rate at Project Completion
If you have calculated the projected water rate at project completion, please enter it here and provide an explanation of how it was calculated. If not, enter TBD.

Projected Rate
$1,376.

Affordability Index
1.89

Project Information

Project Name
Pound Road Waterworks Pump Building Upgrade

List all cost categories (Construction Contingency, Engineering/Planning, etc.) for this project. Add rows as needed. Do not include preliminary design engineering and testing costs prior to submittal of the funding application as a component of total project cost.

Project Cost (drinking water costs only)

Category	Dollar Amount
Construction Costs	357900.
Other: Construction Management	17200
	Sum: 375100

Project costs are based on:
Bid from Nealy & Chase dated 9/05/2020 and Horizons Engineering Change of Scope dated 9/21/2020

Outside Funding Sources

1. Have you applied to the Drinking Water State Revolving Fund (DWSRF) for this project?
Yes

1a. DWSRF Funding

Amount Requested	Status
277500	Approved

2. Have you applied to the USDA Rural Development (RD) program for this project?
No

2b. Why not?
Wilmot's MHI of 72656 is 98% of the NH MHI of 74057 which would make it unlikely that we would get a USDA RD grant.

3. Have you applied to Community Development Block Grant (CDBG) program for this project?
No

3b. Why not?
Wilmot's MHI is 98% of the NH MHI which exceeds this programs maximum of 80% of the state MHI.

4. Have you applied to other funding programs?
No

4b. Why not?
We cannot find other sources as affordable as our DWSRF loan

5. Will developers, property owners or other private entities be contributing to the project?
Yes

5a. Private Funding Sources

Total Contributions	Status	Are there conditions on the funding?	Please describe the conditions
15100	Approved	No	

6. Is the applicant contributing its own funds to the project (cash, capital reserve, bonding from another lender, etc.)? (Do not include a requested DWGTF loan or grant.)
No

6b. Why not?
The property owners are the owners of the Pound Road Waterworks

The sum of Other Funds Contributing to the Project + Requested Trust Fund Loan + Requested Trust Fund Grant must equal the Total Project Cost.

Note: Per the Commission's rules, the Commission will endeavor to leverage the DWGTF to the greatest extent possible by taking into consideration, among other things, supplemental funds provided by the applicant. Applications for loans or grants that demonstrate that the applicant has exhausted all other possible funding sources for the proposed project may be given priority. There is no match requirement for loans; however, project proposals that provide the greatest amount of funds from sources other than DWGTF grants or loans whenever possible may be given priority.

8. Confirmed "Other" Funds Contributing to the Project

Source	Amount
NONE PROVIDED	$
NONE PROVIDED	$

Loan Funding Request

Requested LOAN Amount
$

Requested Loan Term
NONE PROVIDED

Loan percent of total project cost:
%

Do you wish to apply for GRANT funding?
Yes

Grant Funding Request

Per the Commission's rules, projects that first request DWGTF loans whenever possible may be given priority over similar projects that request DWGTF grants. Projects that request a smaller proportion of DWGTF grant as compared to DWGTF loans whenever possible may be given priority.

Requested GRANT amount
$82500

Percent grant requested of total project cost
%22

Attachments

Form 1 - Funding Application
Form 1 DWGTF Funding Application - Signed.pdf - 10/28/2020 03:30 PM
Comment
NONE PROVIDED

Form 1S - Special Project Funding Application Supplement

Form 1S Special Projects Supplemental Information - Signed.pdf - 10/28/2020 03:30 PM

Comment

NONE PROVIDED

Form 2 - Authority to Submit

Form 2 Authority to Submit a Funding Application - Signed.pdf - 10/28/2020 03:31 PM

Comment

NONE PROVIDED

Form 3 - Planning Document

Form 3 Planning Document - PRWW.pdf - 10/28/2020 03:31 PM

Comment

NONE PROVIDED

Attachments

Date	Attachment Name	Context	Confidential?	User
10/28/2020 3:31 PM	Form 3 Planning Document - PRWW.pdf	Attachment	No	Kenneth Aldrich
10/28/2020 3:31 PM	Form 2 Authority to Submit a Funding Application - Signed.pdf	Attachment	No	Kenneth Aldrich
10/28/2020 3:30 PM	Form 1S Special Projects Supplemental Information - Signed.pdf	Attachment	No	Kenneth Aldrich
10/28/2020 3:30 PM	Form 1 DWGTF Funding Application - Signed.pdf	Attachment	No	Kenneth Aldrich

Status History

	User	Processing Status
10/28/2020 2:47:57 PM	Kenneth Aldrich	Draft
10/28/2020 3:44:35 PM	Kenneth Aldrich	Submitting
10/28/2020 3:44:48 PM	Kenneth Aldrich	Submitted

Processing Steps

Step Name	Assigned To/Completed By	Date Completed
Form Submitted	Kenneth Aldrich	10/28/2020 3:44:48 PM
Download Submission	Erin Holmes	

TABLE 2
DRINKING WATER AND GROUNDWATER TRUST FUND
Summary of Grant and Loan Awards
2017 - 2020

Grants/Loans	2017		2018		2019		2020		Cumulative Totals
	Infrastructure Assistance Program	Source Water Protection Grant Program	Infrastructure Assistance Program	Source Water Protection Grant Program	Infrastructure Assistance Program	Source Water Protection Grant Program	Infrastructure Assistance Program	Source Water Protection Grant Program	
DWGTF Grant Funds	$11,330,000	$200,000	$12,032,277	$2,387,487	$26,543,017	$1,172,910	$17,252,686	$799,730	$71,718,107
DWGTF Loan Funds	$25,066,500	$0	$7,641,000	$0	$17,194,315	$0	$1,851,250	$0	$51,753,065
Total DWGTF Award	$36,396,500	$200,000	$19,673,277	$2,387,487	$43,737,332	$1,172,910	$19,103,936	$799,730	$123,471,172
Total Infrastructure and Water Supply Land Investment of all Approved Projects (see note 1)	***$84,943,800***	***$200,000***	***$32,206,677***	***$9,199,990***	***$68,198,724***	***$7,026,647***	***$40,517,225***	***$2,216,909***	***$244,509,972***

Note:

1. The total drinking water infrastructure and water supply land investment is the total project cost for all projects funded by the Drinking Water and Groundwater Trust Fund.